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Vol. XLV

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FLIGHT

and The AIRCRAFT ENGINEER

OFFICIAL ORGAN OF THE ROYAL AERO CLUB

JANUARY 27th, 1944

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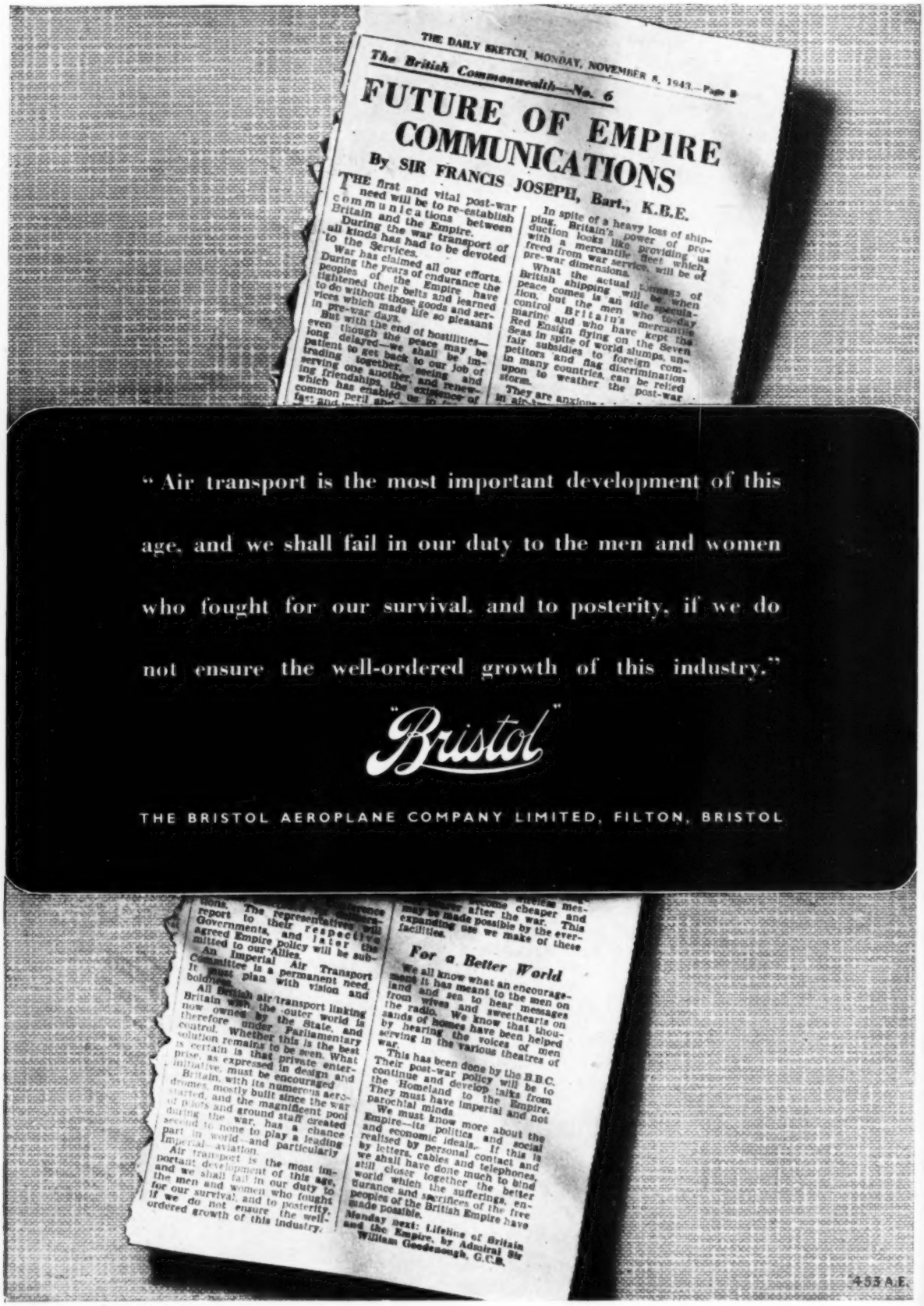
THE DAILY SKETCH, MONDAY, NOVEMBER 8, 1943—Page 9
The British Commonwealth—No. 6
FUTURE OF EMPIRE COMMUNICATIONS
By SIR FRANCIS JOSEPH, Bart., K.B.E.
THE first and vital post-war need will be to re-establish communications between Britain and the Empire.
During the war transport of all kinds has had to be devoted to the Services.
War has claimed all our efforts.
During the years of endurance the peoples of the Empire have tightened their belts and learned to do without those goods and services which made life so pleasant in pre-war days.
But with the end of hostilities—even though the peace may be long delayed—we shall be impatient to get back to our job of trading together, seeing and serving one another, seeing and renewing friendships, the existence of which has enabled us to
common peril
In spite of a heavy loss of shipping, Britain's power of production looks like providing us with a mercantile fleet which, freed from war service, will be of pre-war dimensions.
What the actual tonnage of British shipping will be when peace comes is an idle speculation, but the men who to-day control Britain's mercantile marine and who have kept the Red Ensign flying on the Seven Seas in spite of world slumps, unfair subsidies to foreign competitors and flag discrimination in many countries, can be relied upon to weather the post-war storms.
They are anxious
"Air transport is the most important development of this age, and we shall fail in our duty to the men and women who fought for our survival, and to posterity, if we do not ensure the well-ordered growth of this industry."
"Bristol"
THE BRISTOL AEROPLANE COMPANY LIMITED, FILTON, BRISTOL
report to their respective Governments, and later the agreed Empire policy will be submitted to our Allies.
An Imperial Air Transport Committee is a permanent need. It must plan with vision and boldness.
All British air transport linking Britain with the outer world is now owned by the State, and therefore under Parliamentary control. Whether this is the best solution remains to be seen. What is certain is that private enterprise, as expressed in design and initiative, must be encouraged.
Britain, with its numerous aerodromes, mostly built since the war started, and the magnificent pool of pilots and ground staff created during the war, has a chance second to none to play a leading part in world—and particularly Imperial—aviation.
Air transport is the most important development of this age, and we shall fail in our duty to the men and women who fought for our survival, and to posterity, if we do not ensure the well-ordered growth of this industry.
may be made possible after the war. This expanding use we make of these facilities.
For a Better World
We all know what an encouragement it has meant to the men on land and sea to hear messages from wives and sweethearts on the radio. We know that thousands of homes have been helped by hearing the voices of men serving in the various theatres of war.
This has been done by the B.B.C. Their post-war policy will be to continue and develop talks from the Homeland to the Empire. They must have imperial and not parochial minds.
We must know more about the Empire—its politics and social and economic ideals. If this is realised by personal contact and by letters, cables and telephones, we shall have done much to bind still closer together the better world which the sufferings, endurance and sacrifices of the free peoples of the British Empire have made possible.
Monday next: Lifeline of Britain and the Empire, by Admiral Sir William Goodenough, G.C.B.
453 A.E.

FLIGHT and The AIRCRAFT ENGINEER

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The Outlook

A Day at Westminster

WEDNESDAY, January 19th, 1944, will deserve to be remembered in the years to come. On that day, for the first time, the Marquess of Londonderry succeeded, in the House of Lords, in extracting from the Government something more than the vague generalities which have been all the reward he has received for his persistent demands for a statement of policy. Lord Londonderry apologised to the House for raising the subject once more. He need not have done so; on the contrary, he has done the nation a very great service by these renewed pleas for a statement of policy.

His remarks on January 19th cleared the air considerably and were in marked contrast to the evasive answers given by previous Government spokesmen. Lord Beaverbrook has not been at Gwydyr House for long, but as might have been expected he has used his time to good purpose. Elsewhere in this issue we give the greater portion of his remarks in full, as we feel they deserve to be on record.

Comparing the design data given by Lord Beaverbrook for the "Brabazon" (100 tons, 50 passengers, two tons of mail, crossing the Atlantic in 15 hours at (250 m.p.h.) with the admittedly somewhat vague references that have been published concerning the machine on which the Bristol Aeroplane Company is engaged, it is not difficult to identify them as being the same aircraft.

Somewhat less ambitious is the second aircraft, the 38-tonner "Tudor," cruising at 220 m.p.h., and capable of carrying, in a pressurised cabin, 12 passengers and luggage across the Atlantic.

The identity of the Tudor was not disclosed by Lord Beaverbrook. Just why there should be this secrecy is difficult to understand. As the Prime Minister of Ontario said recently (the remarks were quoted by the Duke of Sutherland in the debate) that post-war commercial aviation is not a subject about which there need be any secrecy at all. One can only assume that the British authorities fear that our good friends the Americans may misinterpret our actions. They are far more likely to do so if there is any hint at hiding things. And they will certainly be astute enough to see a possible connection between such type names as Lancaster, York and Tudor.

Overlooked?

THERE is one aspect of the post-war air transport field which has been conspicuously absent from these debates. The flying boat seems to have been entirely forgotten. In the House of Lords debate the Duke of Sutherland stated that the Government has ordered two prototypes, landplane and a flying boat. The statement was neither challenged nor confirmed, and so one does not know whether His Grace was right or not. It is to be hoped that the claims of the flying boat to consideration in our plans for the future have not been overlooked. *Flight* made itself the champion of this class of aircraft a great many years ago, in the days when there was a complete failure in official circles to appreciate its possibilities. We have not changed our views, and we believe that in the very large sizes of the future the flying boat must come into its own.

We publish this week an article by Mr. W. P. Kemp in which he points out some of the factors involved. Mr. Kemp has been with Shorts for very many years, during most of which he worked closely with Mr. Arthur Gouge, and so he may be accused of having a bias in favour of the flying boat. On the other hand, he has lived and worked with that subject almost since

flying began, and thus knows all the pros and cons better than most people. We commend his article to the attention of those, including Lord Beaverbrook, who are now having to take decisions the effects of which may be incalculable in the years to come.

Technical Training

THE decision of the Government upon the report of the Interdepartmental Committee, set up by the Minister for Aircraft Production, under the chairmanship of Sir Roy Fedden, to submit proposals for the establishment of a national institution, be it university, college or school, for improved and specialised training in aircraft engineering, is still awaited with considerable public interest. The recent official disclosure of the existence of proved types of jet-propelled aircraft, as well as last week's pronouncements on the subject of huge multi-engined air transports planned for the peace programme, serve to underline the necessity for a more highly trained personnel for industry and the Services.

In the *Daily Telegraph* last week, under the heading "Britain's Need for a College of Aeronautics," the pros and cons of the subject were recapitulated by "An Aeronautical Engineer," and letters followed supporting the plea for a national institution. It was emphasised that the technique of aircraft manufacture had undergone a complete change in the last twenty years. Biplanes of wood, wire and canvas had given place to metal structures of extremely complex character with a number of precision engineering components. Looking ahead, the next ten years may see the adoption of the flying wing, for example, and may even demonstrate that turbine compressor units will form the motive power of transatlantic and ocean-flying aircr . Mr. F. G. Miles, who has long been an advocate of improved facilities for scientific training, has apparently modified his earlier views. Having advocated a university of aeronautics, he now reluctantly abandons the idea for the reason that, in his judgment, the trend of technical education has been towards increasing specialisation and that fewer young people have acquired that broader background essential to creative engineers.

Contrariwise, in some other spheres of engineering activity there is a feeling that the more urgent need is for more colleges for the training of basic engineering, and, indeed, modern youth does sometimes exhibit the tendency to fly before it can walk! This general agitation tends to confuse the issue. On the other hand, the Royal Aeronautical Society, which has hitherto carried out the spade work of aeronautical education in this country, is in favour of the original scheme for a national institution. What certainly does emerge from the discussion is unanimity for improved facilities for training in scientific research. Many desire to see a college providing education and training on the highest basis, to which should go only those who have obtained, either from a university or through other educational channels, a first-class basic engineering training. Additionally, there are those others who, eligible to go far in industry, either as general managers or directors, should have opportunity while they are still young to obtain technical instruction and background knowledge which it is impossible to obtain in any other way. Thus the whole gamut of aviation technique in administration and production would be covered in a comprehensive staff college such as has been envisaged alike by influential folk in the Government and in the industry.

Even if the decision of the Government upon the matter is to be further delayed—for any good reason—some idea of the tenor of the Interdepartmental Commitee's report would be warmly welcomed as a basis for further interim comment.

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BRITAIN'S FIRST MILITARY TRICYCLE: The Armstrong-Whitworth Albemarle reconnaissance bomber which is now used as a glider tug and armed freighter. An illustrated description appears on pages 87 to 91.

War in the Air

FIGHTER OVER FEZ : A ferry pilot delivering a Spitfire from the aircraft park at Casablanca to an operational base.

Hitting the Germans in the Aegean : Contrasted Policies in Italy : A Riddle for the Japanese

LAST week mention was made of the Allied air effort against the Balkans in general, and the confusing effect which it must have on the minds of the Axis leaders. Some more details have since come from Cairo. The Germans in the Aegean are doing much what the Japanese have tried to do in the South West Pacific, by basing their defence on a line of fortified islands, described in the rhetorical way which the Germans so much affect, as an "iron ring." The main points are Crete, Rhodes, and Scarpanto, the last named lying between the first two. On these islands and others near by are considerable German garrisons, while Crete and Rhodes in particular are well off for airfields. The detachments of the *Luftwaffe* on the islands are an advanced screen, backed by a stronger force of aircraft on the mainland, chiefly congregated on the bases round Athens.

It is exceedingly unfortunate that Rhodes was not seized by the British at the time of Italy's surrender, but now it is no use crying over spilt milk. The Mediterranean Air Force is doing its best to remedy the situation by a series of attacks on both the forward screen and the bases. One hears frequently of air raids on the Eleusis airfield and others in the neighbourhood of Athens, as well as on the port of the Piraeus. It is not only necessary to hit the airfields as hard and as often as possible, but also to interfere with the ships which carry supplies to the islands. Many of these are schooners, and presumably the crews are Greeks. One feels sorry for them, for doubtless they hate their German oppressors as heartily as the rest of their compatriots do. But hunger is a great compelling force, and starvation has been rife in Greece ever since the Germans overran it. In any case, the supplies have to be checked at all costs, and so the vessels have to be attacked by Allied aircraft and submarines whenever possible.

MADE IN GERMANY : A flak hole in the wing tip of a Fortress which just managed to struggle back to its base in England.

Accordingly, between the first week in September and the middle of November the R.A.F. made 2,250 sorties into the Aegean, while the Americans also made well over 1,000. The R.A.F. sent out bombers, fighter-bombers and fighters. Many supply vessels were sunk or damaged, and to the air effort must be added the operations of the naval submarines. Greek warships work with the Royal Navy, knowing that the work all helps towards the liberation of their country. Other Allies also share in the work, and a Polish submarine, the *Dzik*, has, since May, 1943, sunk 18 enemy vessels of a tonnage of 48,500.

The Italian Campaign

MANY of our readers will remember that Lord Wavell, in making out his list of the greatest generals in history, included Belisarius. It is fitting to remember him now, for we British are in a way following in his footsteps. That great General of the Emperor Justinian was set the task of reconquering Italy from a race of German invaders, the Ostrogoths, though those Goths were very much more presentable specimens of the German race than are the modern Prussians and the other tribes whom Bismarck and Hitler have banded with them. Belisarius never completed the work, though his successor did and expelled the Goths completely from Italy. One wonders what his shade must be thinking about the slow pro-

WAR IN THE AIR

gress of the Allies. Of course he knew all about the winter weather in the Apennines, and also about the use of the engines of war available in his day, and his shade must be pondering the use of aircraft in Italy to-day. Probably he admires the way in which the Germans are reserving theirs for use against the great invasion from the north-west, leaving the hills and the weather to protect the German ground troops from the light bombers and fighter-bombers of the Allies. Equally admirable is the way in which the Allies use their air strength to cut the rear communications of the enemy. Last week our heavy bombers, flying with escorts, attacked railway communications at Pisa and a number of other places, and for a time cut all railway connections between Rome and the north of Italy.

The Germans are unlikely to interfere seriously with escorted bombers as that would risk the loss of their precious fighters. They mean to delay the Allies in Italy as long as they can, but not to weaken their air defences in a holding campaign.

Threat to Rabaul

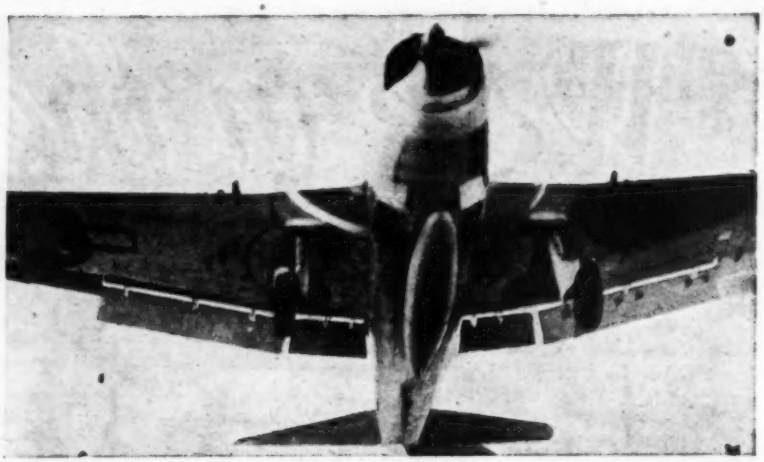
THE Chief of Staff of the South Pacific Command, Rear-Admiral R. Carnley, has made a statement to the Press in which he did not attempt to disguise the immediate intentions of Gen. MacArthur. In fact, he said that Rabaul in New Britain and Kavieng in New Ireland were the next obvious points of Japanese strength, and that the Allies were aiming at their elimination. So much, of course, must be obvious to the enemy. The Admiral, however, mixed his outspokenness with a little intriguing mystery, saying that the Allies' method of putting those two places out of business would be something the enemy least expected, and would not be in accordance with any familiar pattern. That riddle will give the Japanese High Command something to puzzle over. In any case, the enemy must know that those two bases cannot serve him much longer, for Rabaul is now subject to round-the-clock bombardment from the air, including mast-height attacks on shipping and installations.

The Admiral also said that under continuous air cover three airfields had been constructed at Empress Augusta Bay in Bougainville. The Japanese had abandoned all attempts to use their airfields on Bougainville and Buka, and only a few floatplanes were working from that area. By means of air and sea power the Americans controlled the sea well to the north of Buka island, and the enemy had been obliged to resort to barge traffic by night for the supply and evacuation of his troops there.

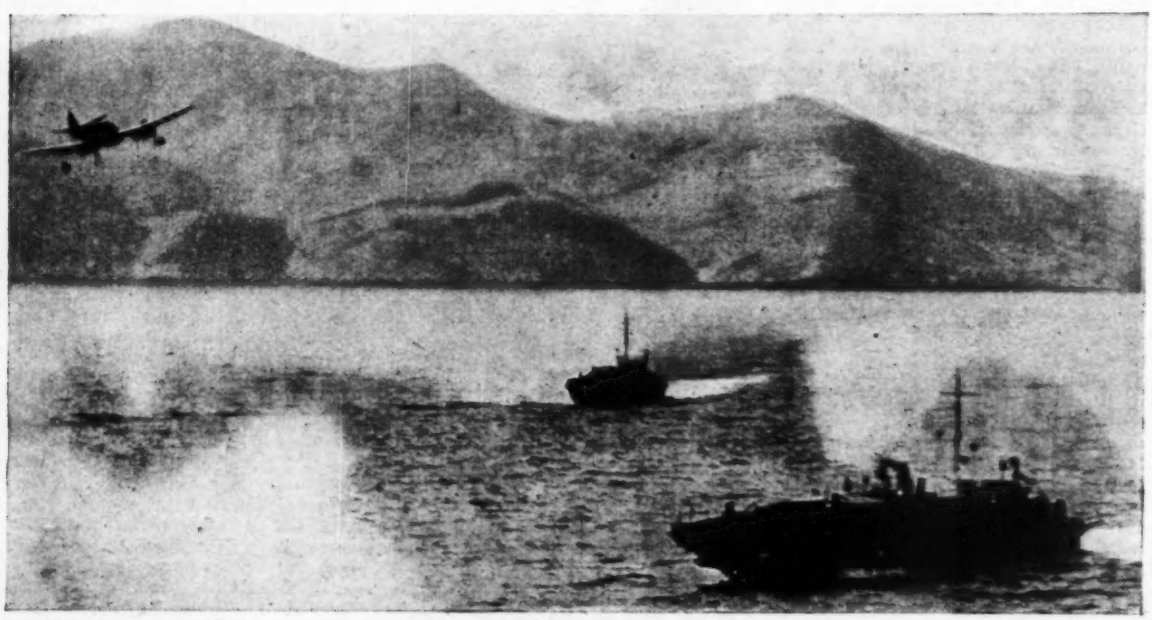
It sounds as if some aircraft equipped with the Leigh light would be useful to the Americans, to enable them to see targets by night.

Chilly Germans

THOUGH the present winter has been unusually mild in Russia, there must be many German soldiers fighting there who are not hardened to even the prevailing degree of cold. No doubt the German forces are now



WORM'S-EYE VIEW OF A CAT: An unusual shot of a Hellcat as it takes off from one of the U.S. carriers in the Pacific. A long-range tank is being carried.



BEAUFIGHTER BOMBER: An attack by Bristol Beaufighters on two enemy flak ships in the Dodecanese. Two bombs can be seen leaving the wing racks of one of the attacking aircraft.

WAR IN THE AIR

ENEMY AIR LOSSES TO JAN. 22nd

	Over G.B.	Continent	Middle East	N.W. Africa
Jan. 16 ...	0	1	0	21
,, 17 ...	0	0	0	0
,, 18 ...	0	0	0	7
,, 19 ...	0	2	0	3
,, 20 ...	0	0	0	5
,, 21 ...	12	7	0	20
,, 22 ...	0	0	0	15
	12	10	0	71

Totals : West, 7,894 ; Middle East, over 5,760; North-West Africa, 4,044.

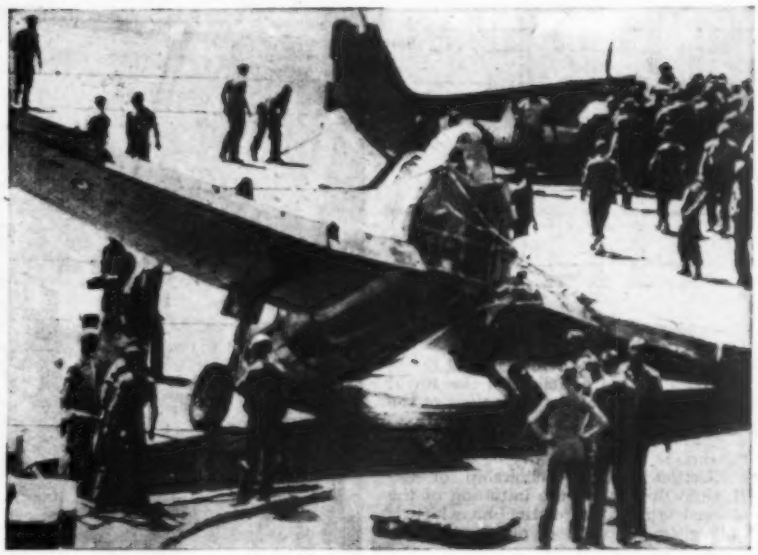
much better clad than they were in the first winter which the *Wehrmacht* spent in Russia, when they had to beg, borrow (?) or (more likely) steal women's furs and other civilian garments, but all the same clothing is a big problem now for all Germany.

It is therefore extremely satisfactory to learn from the experts who scrutinise the photographs taken after a raid by Bomber Command that more than a third of the great woolcombing factory in Leipzig, which is the third largest plant of its kind in the *Reich*, was destroyed in the great raid of December 3rd. The deaths and sick casualties from cold in a campaign in Russia during the winter must in any case be high.

BRITISH & U.S. AIR LOSSES TO JAN. 22nd

	Over G.B. A'crft.	Continent B'brs.	Continent F'ters.	Middle East A'crft.	N.W. Africa A'crft.
Jan.					
16	0	0	0	0	5
17	0	0	0	0	0
18	0	0	0	0	3
19	0	0	0	0	2
20	0	36	1	0	2
21	0	60	2	0	5
22	0	0	0	0	9
	0	96	3	0	26

Totals : West, 9,349 ; Middle East, about 2,345 ; North-West Africa, 1,537.



MANX CAT: With its hydraulic system shot about this Hellcat made a deck landing with only one undercarriage leg down. The hook caught in the arrester wires and the machine was pulled neatly in half at the cockpit.

Behind the Lines

FOR a long time past observers have been wondering why the Fifth and Eighth Armies should have gone on battering their way forward against strong opposition when the geography of Italy simply calls for landings behind the enemy's lines—provided always that the Allies held superiority on the sea and in the air. They hold both, but the step which seemed obvious to all of us armchair critics was delayed. That there were good reasons for the delay we must believe, though we do not yet know what they were; only the men on the spot could know them.

At any rate, before dawn last Saturday elements of the Fifth Army made a landing on beaches somewhere to the south of Rome, and about 75 miles ahead of the most forward spot occupied by the main body of the Fifth Army. It was made on the same pattern as previous landings, with both British and American troops participating, with British and American warships escorting the landing barges, and with ample air cover.

The surprising thing is that the Germans were evidently taken by surprise. They surely ought to have expected this very thing to happen, even as it did. It was over two hours before the first shot was fired, and it was a full seven hours before the first German aircraft appeared and did their best to bomb the ships.

All the available air strength in the Mediterranean was called upon to support the landing, and continuous land-based fighter cover was maintained over the beaches. As at Salerno, this meant a continuous series of reliefs by squadron after squadron.

For days before the landing all the efforts of the Mediterranean Air Force had been directed to preparations for it. Heavy and medium bombers each played their parts, and airfields, railways and roads had been so heavily bombed that it must have been physically almost impossible for the enemy to move up either aircraft or ground troops in a hurry.

In the meantime Berlin was bombed to the tune of over 2,000 tons one night, and as the troops were going forward from the landing beaches in Italy heavy machines of Bomber Command were flying homewards after delivering another 2,000 tons on the important city of Magdeburg.

DEATH OF ADMIRAL MARK KERR

ADMIRAL MARK KERR, C.B., M.V.O., whose death is announced, was a man of many accomplishments, but by readers of *Flight* he will be chiefly remembered as an airman. He was a Rear-Admiral when in 1914 he took his Royal Aero Club certificate in a Sopwith seaplane. In 1916-17 he was in command of the British naval forces in the Adriatic, where his knowledge of aircraft proved very useful. He astonished the Italians by flying one of their Löhner flying boats on a day which they said (possibly through doubts of an Admiral's abilities in the air) was too bad for flying.

On the formation of the R.A.F. in 1918, Kerr was made Deputy Chief of the Air Staff, with the rank of Major-General, R.A.F., although he had never been in the R.N.A.S. Later he commanded the R.A.F. South-West Area.

When the *Daily Mail* offered a prize for the first non-stop flight over the Atlantic, Admiral Kerr took a Handley Page V/1500 (four Rolls-Royce Eagles) over to Newfoundland, with Major H. Brackley as co-pilot. Technical troubles delayed their start, and Alcock and Whitten-Brown got across first.

A.T.A. BENEVOLENT FUND

DONATIONS continue to trickle in to this deserving fund, and the total to January 18th is given below together with donations received since publication of the last list in the issue of December 16th, 1943:—

	£	s.	d.
Already acknowledged ..	8,400	4	1
Subscriptions by members of A.T.A. and B.O.A.C.	2,775	17	7
Handley Page, Ltd. ..	250	0	0
Field Consolidated Aircraft Services, Ltd...	15	0	0
Group Capt. G. W. Williamson, O.B.E., M.C.	10	10	0
Aeroparts Engineering Co., Ltd.	10	10	0
F. K Hollywood (2nd contribution)	2	2	0
R. A. Newman, Kenilworth		5	0
Miss J. M. Smith, Aldershot		5	0
D. W. F. Baldwin, Leamington Spa		2	6
	£11,464	16	2

HERE AND THERE

Two More Honours

GRP. CAPT. FRANK WHITTLE has been elected a Fellow of the Royal Aeronautical Society at a meeting of the Council held on the Society's 78th birthday, and has also received the M.A. at Cambridge, taking the degree by proxy.

Election to full Fellowship of the R.Ae.S. directly at the initiation of the Council is a special distinction which is only given for work of outstanding importance in aeronautics.

"Identification of Aircraft"

COPIES of "Identification of Aircraft" containing 82 of the types dealt with in *Flight's* recently concluded series, "Aircraft Types and their Characteristics," are now available from this office in limited quantities at 5s. each or 5s. 3d. by post.

Back to the Air League

ON his retirement from the R.A.F. with the cessation of the inspectorship of the A.T.C., Air Commodore J. A. Chamier has been appointed Executive Controller of the Air League of the British Empire, of which he was Secretary-General from 1933 until he was recalled to the R.A.F. in 1939.

"H.M.T. Rolls-Royce"

EMPLOYEES of Rolls-Royce, Ltd., who recently adopted the minesweeper named after their firm, have decided to send its crew reading matter, including a copy of *Flight*, for which they are advancing a year's subscription.

Flight will thus be mailed to the Commanding Officer, "H.M.T. Rolls-Royce," c/o G.P.O., London, each week.

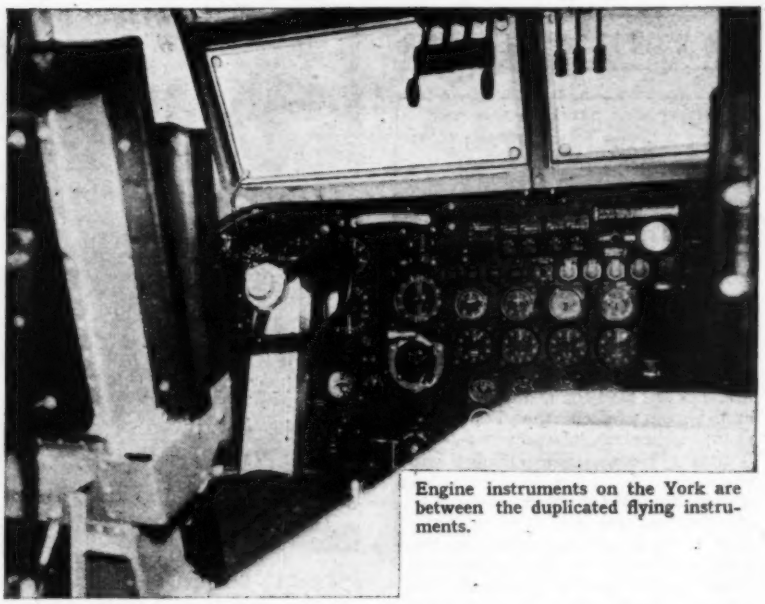
Society of Aircraft Engineers

AT the two-day meeting of the Foundation Committee held on January 17th and 18th it was finally decided that this new body shall be known as "The Society of Aircraft Engineers," whose temporary offices are at 356-366 Oxford Street, London, W.1 (Tel. 0818 Mayfair). All enquiries should be addressed to the secretary at the above address. Among other business dealt with at this meeting, the aims, objects, policy and constitution of the Society were drafted and will be made known at the general meeting to be called shortly.

R.A.F.V.R. Club

IT is proposed to form a club for the original members of the R.A.F.V.R., and those who are interested should get into touch with Lt. (A) Harold A. Epps, R.N.V.R. (late Sgt. Pilot 740753), at the Royal Naval Air Station, Worthy Down, near Winchester, Hants.

Lt. Epps has already received a fair number of letters from prospective members, but thinks there may be many eligible for membership who are not yet aware of the project.



Engine instruments on the York are between the duplicated flying instruments.

Speed Not Everything

CAPT. J. L. PRITCHARD, secretary of the R.Ae.S., deplored the fact that so much research had been devoted to the quest for more speed when he recently addressed a branch meeting of the society at a Blackburn aircraft factory; what was wanted, he maintained, was slower take-off and landing.

The title of his talk was "Bird Flight and the Aeroplane," and he advocated more study towards the type of machine that could fly at "nought" m.p.h. so that heavy post-war air traffic would not absorb huge expanses of land for airfields.

View Your Share in Victory

A WORKS exhibition staged in a Rootes aircraft engine factory in the Midlands is designed to let employees see for themselves just what role is played in the completed engine by the various components and small parts they make.

Another important aspect of the show is designed to drive home to every worker the seriousness of making scrap. The exhibition was arranged by the factory's joint production committee.

Air Aid to Turkey

TURKISH draughtsmen and engineers are to be sent to this country and to the U.S. to complete their training in aeronautical engineering after taking initial courses at home, it has been announced by *Airligue*, the organisation which promotes flying in Turkey.

The organisation's administrative council also reported that the greater part of the supplies in aircraft machinery ordered in G.B. and U.S. has been delivered to Turkey during the past six months.

Smoke Screen

THE German News Agency, quoted by Reuter, recently said that Allied aircraft which raided Rome used a dense smoke screen as a protection against accurate A.A. fire.

U.S. Air Mission

A GROUP of American Army and Navy officers is visiting Venezuela to help with aviation problems there, and Mr. Cordell Hull, U.S. Secretary of State, and Dr. Diogenes Escalante, the Venezuelan Minister, have signed an agreement similar to those made with other Latin-American countries. The agreement is for four years and is renewable at Venezuela's request.

Jet Propulsion

MESSAGES and letters of congratulation in connection with Mr. Geoffrey Smith's recent broadcasts and articles on jet propulsion in the daily and technical Press continue to arrive at *Flight* offices. Amongst these congratulations none was more pleasing than a cablegram from Mr. W. Hudson Fysh, D.F.C., of the Queensland and Northern Territory Aerial Services, Ltd., of Australia, better known as Qantas. He said: "Congratulations on your broadcast which listened to here with great interest."

Two cheques for £10 also arrived to be handed over to the Red Cross Prisoners of War Fund from Mr. F. J. Robinson, a well-known manufacturers' agent and pioneer motorist of Coventry, on condition that *Flight* secured for him, duly autographed by Grp. Capt. Frank Whittle and Mr. Geoffrey Smith, two copies of "Gas Turbines and Jet Propulsion for Aircraft." This was arranged, and the two cheques have been handed over to the Fund.

This generous action may inspire others to emulation.

Armstrong-Whitworth Albemarle

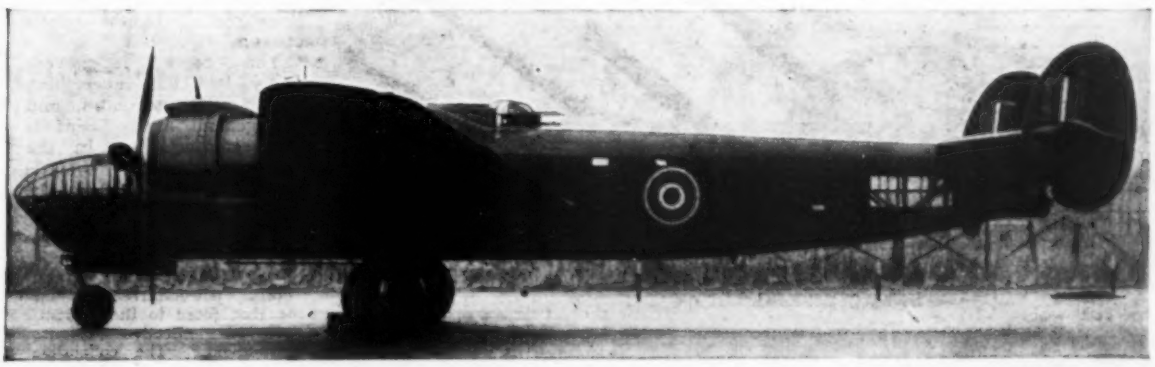
Illustrated by "Flight" photographs

Tricycle Undercarriage : Compound Structure : Every Item Sub-contracted

THE Albemarle is unique in more than one respect: to begin with, it is the heaviest and the only operational British aircraft fitted with a tricycle undercarriage; secondly, the machine was designed specifically to meet grave difficulties looming ahead when it was planned—the impending shortage of light alloys and the dearth of experienced aircraft manufacturing facilities. The short supply of light alloys and other specialised materials was overcome by utilising wood and steel almost exclusively in the construction, and considerable ingenuity has been exercised in providing a strong, rigid, compound structure, easy of assembly and having a percentage structure weight only a little above average for aircraft in this class.

Production was begun straight from the drawing board some time before the prototype underwent its initial flight trials. It is an interesting aspect of production methods that the Albemarle is completely sub-contracted to firms ranging from furniture makers to manufacturers of hairdressing equipment, and, the machine being split up into a number of major sections, all that is done finally is to assemble these sections into the complete aircraft.

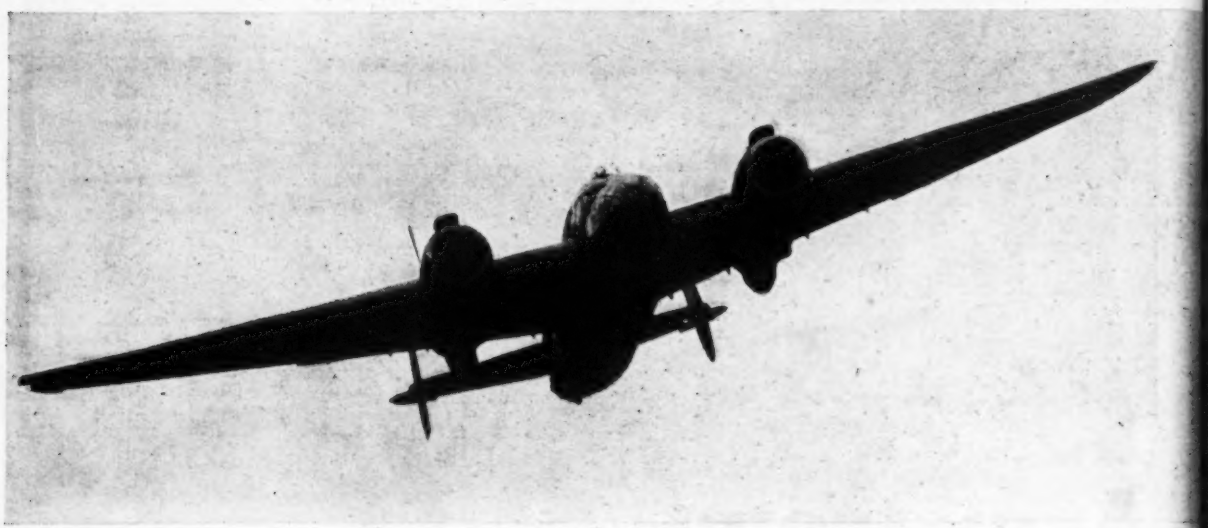
As may be seen from the illustrations, the Albemarle is a mid-wing monoplane with twin fins and rudders set almost at the tips of, and normal to, the tailplane, which has a



The characteristic clean lines and attitude of the Albemarle are well shown in this illustration, and particularly noticeable is the absence of "stalkiness" in the undercarriage, giving the machine almost a Liberatoresque appearance.

D

ARMSTRONG-WHITWORTH ALBEMARLE



In this climbing turn to starboard the neat proportions of the aircraft are emphasised. The angle of view makes it appear that the retracted wheels protrude farther from the nacelles than they actually do.

slight dihedral angle. The tricycle landing gear is wholly constructed by Lockheeds and a very nice installation it is; the retraction and extension action is positive and rapid, whilst the clean strength of the units is very apparent.

The nosewheel, which is fitted with a small mudguard, retracts backward, and when locked in the up position only a small "blister" of the tyre protrudes below the fuselage. In the case of the main wheels the tyres protrude a greater amount beneath the nacelles but are snugly faired by the undercarriage doors. Bristol Hercules XI power eggs with fully feathering De Havilland hydromatic airscrews are employed.

The Albemarle was originally designed as a bomber-reconnaissance aircraft and, as a bomber, is fitted with an electrically operated four-gun Boulton-Paul dorsal turret, forward of which is a fairing hydraulically actuated and automatically controlled to collapse when the guns are pointed forward. The bomb bay is of generous proportions and runs from immediately behind the cockpit to approximately half way between the main plane trailing edge and the tailplane leading edge. The bomb doors are orthodox in design and are opened and closed hydraulically.

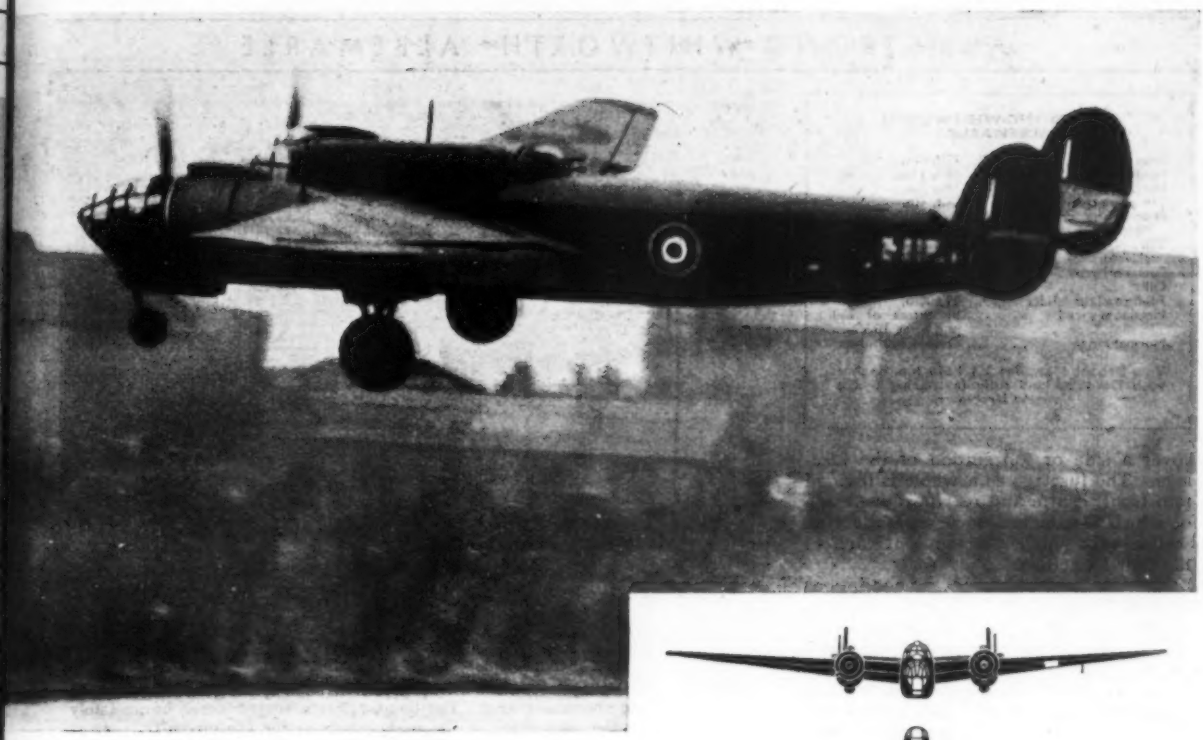
Special Transport

Owing to changes in policy for the prosecution of the war, the aircraft was converted to perform a variety of rôles, among them that of special transport. For this purpose, a large freight door was fitted in the starboard side of the central fuselage portion, operational bombing equipment and the rear fuselage fuel tank was removed, whilst the four-gun turret was superseded by a two-gun hand-operated installation covered by a sliding hood. As a special freighter the Albemarle was delivered to one of our greatest Allies and there it earned for itself a very good reputation.

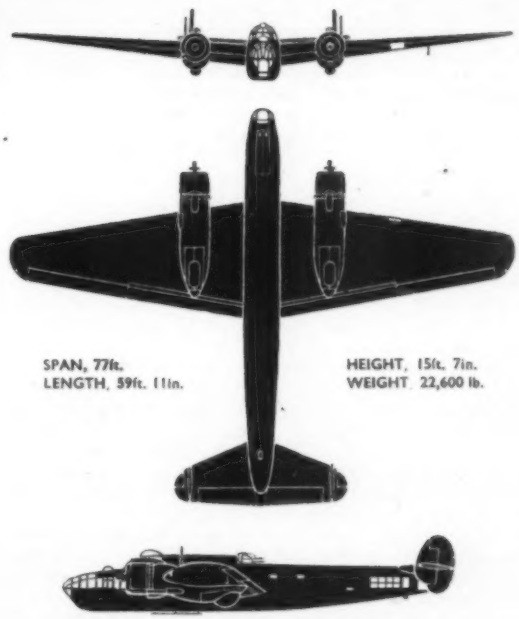
The main purpose for which this aircraft now functions is that of glider tug, and the original layout is largely retained. A Malcolm type quick-release hook is fitted at the rear extremity of the fuselage, with a release control in the pilot's cockpit.

The "office" is conveniently laid out, everything comes nicely to hand, and the general arrangement is very comfortable. In the "Dumbo," as the Albemarle has been nicknamed in the

The Boulton - Paul 4-gun dorsal power-turret, similar to that fitted to the Defiant, provides effective defence armament. The collapsible valances of the turret fairing allow it to be lowered when the guns are pointing forward.



Coming in to land with flaps and landing gear down. The landing speed is moderate and the relative sinking speed is also fairly low.



Service, the front fuselage portion is almost completely glazed, the few non-glazed portions being covered with alclad sheet as a protection against ice flung from the airscrews. The navigator sits below and forward of the pilot, by whose side sits the second pilot, with the wireless operator at the rear.

Crew positions are well armoured, the deflector plates even extending over the floor. The bomb-aimer's inclined, optically corrected panel is fitted in the lower portion of the nose and is hinged to form the main entrance for the crew. The unusual feature of the perspex panels at the rear end of the fuselage was incorporated for the original purpose of the machine, so that the fire controller could command a large field of lateral and rearward view.

Originally, a two-gun ventral turret was fitted in addition to the existing dorsal turret, and for the co-ordination of total effective fire power, a fire controller was required.

The neat, sturdy, starboard undercarriage leg. The rear part of the wheel fairing doors are splayed so that when shut the tyres are snugly protected.

Characteristics and Structure

Although an unusual aircraft, pilots who fly Albemarles like them very well, and in this connection it is worthy of mention that the single-engined handling characteristics are above the average. The machine is well balanced, reasonably light on the controls and has no vices.

Structurally, as may be inferred from its composite nature, the Albemarle is an interesting job. The fuselage is a steel-tube gusseted structure to which is fixed a non-stressed skin of plywood on spruce formers. The skin panels are made in large sections so that, generally, they

ARMSTRONG-WHITWORTH ALBEMARLE

ARMSTRONG-WHITWORTH ALBEMARLE

Span	77ft. 0in.
Length	59ft. 11in.
Height (to tip of airscrew)	15ft. 7in.
Tail plane span	26ft. 4in.
Main plane area, including ailerons	803.5 sq. ft.
Tail plane area, including elevators	164.43 sq. ft.
Fuel	Over 750 gallons.
Oil	Over 60 gallons.
All-up weight (glider tug)	22,600lb.
Maximum speed	In excess of 250 m.p.h. at 10,500ft.
Normal range	Over 1,300 miles.

Two Bristol Hercules XI 1,590 h.p. engines with De Havilland fully feathering hydromatic airscrews.

The nosewheel fairing doors close in sequence controlled by the guard ring around the front of the nosewheel strut. The bomb-aimer's hinged panel, immediately above the nosewheel, is the main entrance for the aircraft.

cover a side or top section of the fuselage. The fuselage as a whole is divided into front, centre and rear portions, each of which is attached to its neighbouring section with single pin joints at each of the four longerons.

The main wing spar is continuous through the fuselage, the front and centre fuselage sections being attached respectively to the front and rear pick-up points on the spar. To lessen compass interference, the front fuselage section is constructed of stainless steel tubing while the centre and rear sections are made up in high tensile steel tubing; both have gusset plate joints. The floor is of wood supported on a wooden structure except over the bomb bay; in the front fuselage section, the bomb bay floor is a stainless steel structure covered with light-alloy sheet which acts as armour deflector sheeting. An armour plate bulkhead is fitted before the front face of the main spar, with a folding door giving access to the centre fuselage section. The hydraulically operated bomb doors are constructed of spruce and plywood formers, covered with plywood skin and attached to a steel tubular spar.

The wing centre section extends through the fuselage and outwards to immediately outboard of each nacelle, and consists of the main spar, leading edge, and power unit and undercarriage mountings. The spar is a girder made up of four high-tensile steel, square-section tubular booms, with tubular shear and torsional bracing. Two massive ribs of steel tubular structure are fitted at each end of the centre section and extend forward to carry the pick-up points for the power eggs; at the rear of each rib are carried four pick-ups for the undercarriage legs. The centre section is covered on top with thick non-stressed plywood between the spar booms, has light alloy nose panels and carries a plywood skin on the underside, although most of the latter area is given to large removable panels for access to the petrol tanks.

Use of Improved Wood

The outer portions of the wings are bolted to the centre section by special expanding pins, and consists of two spars having spruce booms reinforced with light-alloy inserts and plywood webs. Steel tube torsional bracing is fitted and this is assisted by the ply covering between the spars. The steel bracing is connected to the front and rear spars through channel gussets, which are high-tensile steel forgings machined with a serrated base. These serrations "bite" into the outer grain of the plywood webs and take about half the shear load between the channels and the spars. Special ribs which carry the aileron hinge loads are built up of square-section steel tube aft of the rear spar and have spruce booms and plywood webs reinforced with steel channels between the spars.

Interesting use of compressed and impregnated hard wood—called by an unlovely hybrid word "compregnated"—is made at the inner end of the spars, where it assists in taking the high loads from the metal gusset attachment points to the spruce booms. The leading and trailing edges are covered with thin plywood with the outer grain running parallel to the ribs.

The slotted-type flaps are operated and synchronised hydraulically, there being three control selection positions: "up," "take-off" and "dive and land." This latter appears to suggest that it has been found advisable to utilise a fairly large degree of flap when diving, presumably to prevent the build-up to dangerous speed which in a "clean" aircraft such as this, should be fairly rapid.

Single Aileron Trim

The ailerons are of full Frise type, having metal tubular spars forward of the hinge; the ribs have plywood webs and spruce booms, and the whole is covered with plywood skin. Another interesting point is that a pilot-operated trimming tab is fitted to the port aileron only, transmission of trim load being taken through the aileron balance cable.

The tailplane, which has a slight dihedral angle, is flush with the upper surface of the fuselage and is of conventional wooden construction. It is bolted to the rear fuselage structure with two single pin joints on the front tailplane spar and two adjustable links on the rear spar to facilitate ground adjustment of incidence. The two fins and rudders are normal to the tailplane and are fitted about 18in. inboard from the tips, extending above and below the tailplane. The rudders have aerodynamic horn balances at top and bottom, with automatic balance tabs in the upper half of their trailing edges and pilot-operated trimming tabs immediately beneath. Construction is of spruce and plywood ribs mounted on steel tubular spars with plywood outer skin. The fins have two spruce-and-ply spars with similar ribs and plywood covering.

The elevators are made up of plywood and spruce ribs on a tubular metal spar with plywood covering. Each elevator has a large horn balance outboard of the fins and rudders, with a trimming tab on the port elevator and a balance tab on the starboard.

The fuel supply is normally from four tanks, three of

ARMSTRONG-WHITWORTH ALBEMARLE

which are fitted transversely between the centre-section spar booms, with the fourth behind the middle tank in the fuselage. Additionally to this, it is possible to include three auxiliary tanks in the bomb bay, connected into the main fuel system by flexible hose. Oil is supplied from four tanks, two being carried in each nacelle. Each pair of tanks is inter-connected by a balance pipe, the delivery and return being taken from the front tank, which is fitted with a hot pot.

All in all the Albemarle, although officially classified as a second-line aircraft, appears to be a very good although unorthodox job, and when it is considered that well over 1,000 sub-contractors are engaged in its manufacture and there is no parent factory in the true sense of the term—only an assembly base—then those many people who have been concerned in its production deserve a very real measure of appreciation. It is gratifying to learn that visiting representatives of the U.S. aviation industry were frankly amazed that any aircraft could possibly be produced successfully, when every single part was sub-contracted, without the constant supervision and aid available from a parent company. *Flight* is very pleased to see a good aircraft getting at last a highly deserved place in the sun of public and Service opinion.

Four-bladed Hamilton Standard "butter-pat" airscrews are fitted to the American-built Rolls-Royce Merlins in the P-51B.

Long Range Mustang

Credit for the Latest U.S. Fighter Goes to British Air Ministry

THE outstanding success of the Merlin-engined Mustang, the P-51B, which is now generally accepted both here and in America as one of the best single-seater fighters in existence to-day, makes the story of its origin of more than usual interest in view of the fact that it is built by the well-known U.S. firm of North American Aviation Inc.

The traditional British reluctance to indulge in a boasting competition has, until recently, resulted in credit for the development of this aircraft not being placed where it really belongs, and we have the fair-mindedness of the *New York Herald Tribune* largely to thank for restoring the position to something like its true perspective.

Commenting on the P-51B, this newspaper says: "Many have long regarded it as the best fighter plane produced in the U.S., but it remained for the British to discover it. If it had not been for British orders it would never have been developed at all. Its full potentialities were brought out only when the British-designed Rolls-Royce Merlin engine was fitted."

The reference to "British orders" in this handsome acknowledgment no doubt refers to the fact that the Mustang was designed to a British specification and was financed with British money; it was not a lend-lease job. When North American received the specification they did not at first evince any great enthusiasm for it, a fact which may have been due to its un-American character, and/or the realiisation that America's one and only available in-line liquid-cooled engine, the Allison, was somewhat lacking in the matter of altitude performance.

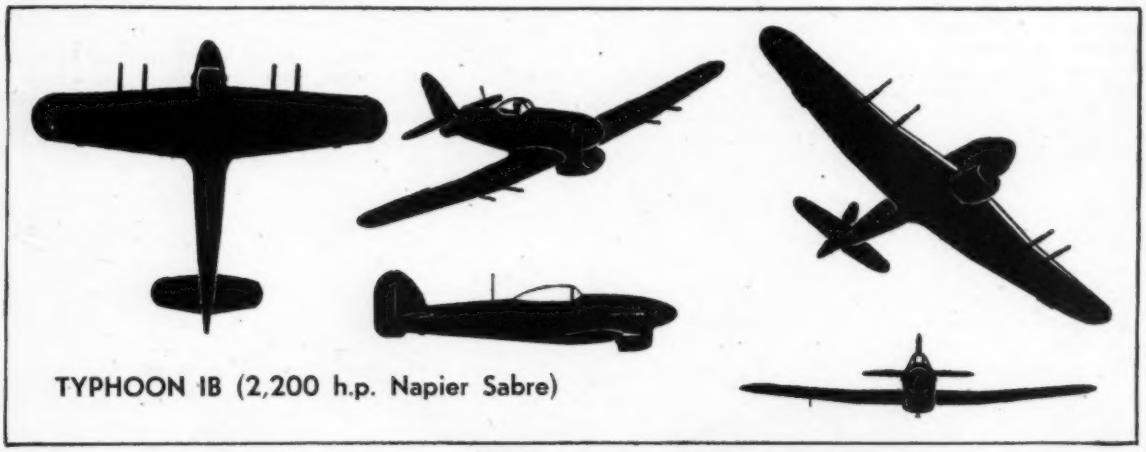
However, Allison-engined Mustangs did much useful work with the R.A.F. Army Co-operation Command until arrangements for Packard to produce Merlins were eventually translated into action, and, in the words of the *Herald Tribune*, the Mustang's "full potentialities were brought out." Incidentally, it was no happy accident that the Merlin was able to replace the Allison without any drastic alterations to the Mustang airframe.

The Merlin LXVIII, built by Packard for the Mustang P-51B, is virtually the Rolls-Royce Merlin LXI with a few minor modifications. It has a two-stage, two-speed supercharger (in contrast to the single-stage, single-speed blower of the Allison), is rated at 1,520 h.p., and maintains its power-output up to 40,000ft. Top speed of the P-51B is over 400 m.p.h.

The P-51B, showing the drop tanks and wing armament of four ·5in. machine guns.

Studies in Recognition

Aircraft in Fi

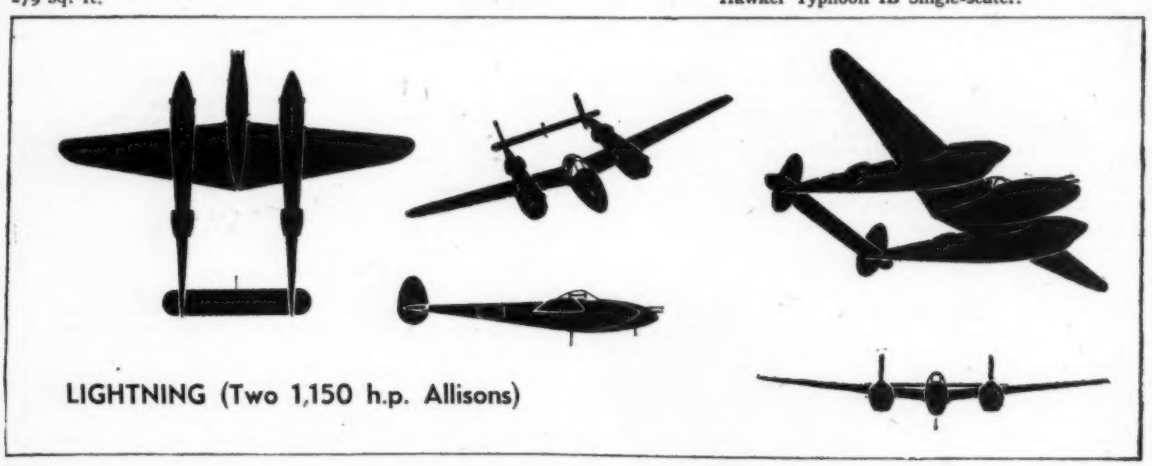


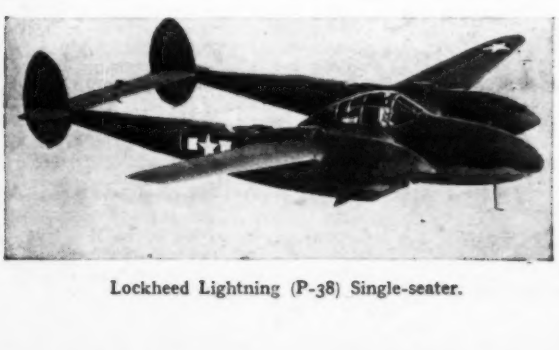
LIKE all modern single-seater fighters, the Hawker Typhoon may be armed with either cannon or machine guns and its function extended to that of fighter-bomber. With two 250 lb. or 500 lb. bombs under its wings it can dive-bomb, though no special dive-brakes are fitted. The Typhoon IB, shown here, has four 20 mm. Hispano cannon. Long-range auxiliary fuel tanks may replace bombs.

Powered by the 2,200 h.p. 24-cylinder Napier Sabre engine, the Typhoon has a top speed of more than 400 m.p.h.

Recognition points include a short, blunt nose, tapered wings with dihedral from wide centre-section and rounded tips, tailplane of similar plan, and "hammer-head" fin and rudder. Deep fuselage with "tear-drop" cockpit cover. Dimensions: Span, 41ft. 7in.; length, 31ft. 11in.; height, 15ft.; wing area, 279 sq. ft.

Hawker Typhoon IB Single-seater.



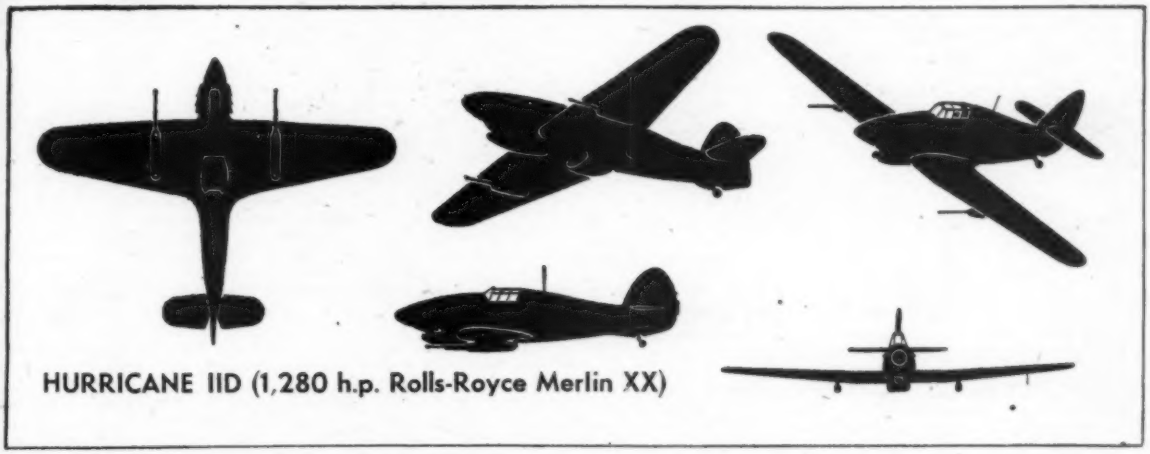


Lockheed Lightning (P-38) Single-seater.

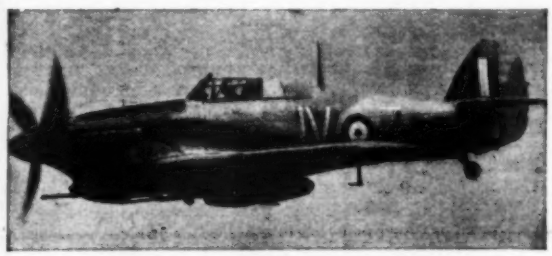
TWIN-FUSELAGE construction and tricycle undercarriage are prominent features of the Lockheed (P-38) Lightning single-seater fighter of the U.S.A.A.F. Two 1,150 h.p. Allisons with turbo-superchargers give the P-38 a top speed of about 380 m.p.h. at 18,000ft. and good altitude performance. Armament consists of one 23 mm. Madsen cannon and four 0.5in. Colt machine guns, all grouped in the nose of the pilot's nacelle. A fighter-bomber version carries two 500 lb. bombs under the centre-section in place of the extra fuel tanks used when on long-range escort duties.

Recognition features include radiator "bulges" amidships of twin fuselages, symmetrically tapered wings with small tips, long nacelles nose, egg-shaped fins and rudders threaded by round tailplane-tips. Dimensions: Span, 52ft.; length, 37ft. 10in.; height, 9ft. 10in.; wing area, 327 sq. ft.

Fing Attitudes

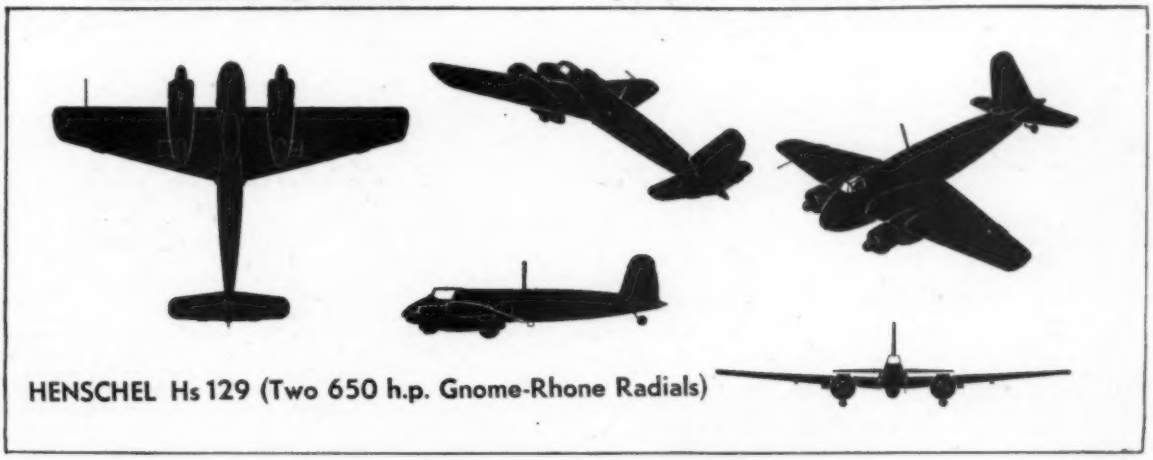


HURRICANE IID (1,280 h.p. Rolls-Royce Merlin XX)



Hawker Hurricane IID "Tank-buster."

THE only material difference between the Hawker Hurricane IID, popularly known as the tank-buster or tin-opener, and the Hurricane fighter or fighter-bomber is its unusual armament. This comprises a pair of 40 mm. cannon mounted in fairings under the wings, and is the heaviest calibre weapon yet fitted to any single-seater, single-engined fighter type. Its duties are indicated by its nickname. Like all current Hurricanes, it is powered by a 1,280 h.p. Rolls-Royce Merlin XX, and, since it was first used for service in North Africa against Rommel's tanks, has a Vokes air-cleaner under the nose. This and the underslung cannon form prominent recognition features. Top speed is about 320 m.p.h. Recognition points relating to wings, fuselage, and tail-unit are identical on all Hurricanes. Dimensions: Span, 40ft.; length, 32ft. 3in.; height, 13ft. 1in.; wing area, 257.5 sq. ft.

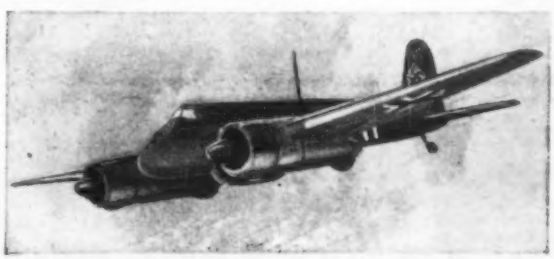


HENSCHEL Hs 129 (Two 650 h.p. Gnome-Rhone Radials)

USED on the Russian front and in Tunisia for ground attack, the Henschel Hs 129 originally had 450 h.p. in-line air-cooled Argus engines, but was later redesigned and fitted with French-built 650 h.p. Gnome-Rhone 14M radials. Still later versions may have B.M.W. engines. Top speed of the Gnome-Rhone version is reported to be 285 m.p.h.

Armament comprises a 7.9 mm. machine gun and a 15 mm. quick-firing cannon on each side of the nose, plus a 30 mm. cannon beneath the fuselage. The last named may be replaced by a bomb-load.

Recognition points include low wings with dihedral angle from the roots, straight leading edge, forward-swept trailing edge and square tips. High-aspect-ratio tailplane with round tips. Egg-sectioned fuselage with short nose. Dimensions: Span, 44ft. 6in.; length, 33ft. 3in.; wing area, 317.5 sq. ft.



Henschel Hs 129 Ground-attack Fighter-bomber.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

JET PROPULSION FOR AIRCRAFT

"Flight" Publications Help in the Factory

YOUR articles and booklet on Jet Propulsion have proved most useful in this factory. Our project engineers have been furnished with copies for some time for reference purposes. The collection of British and foreign designs and their characteristics in such convenient form have served a useful purpose and the services of *Flight* in this regard are greatly appreciated.

MIDLAND MANUFACTURER.

[We are obliged for this tribute. As to other correspondence on Jet Propulsion, it is regretted that we cannot undertake to examine and give private opinions upon a number of designs which have been submitted to these offices.—ED.]

Possibility of Broadcast Electric Power

AS a reader of *Flight*, please allow me to say how greatly I appreciate the journal, and also the efforts of Group Capt. Whittle, "Jerry" Sayer, and the others who helped to make jet propulsion a success. In the issue of January 13th a reader, while praising your advocacy of jet propulsion, enquired what you would turn your hand to now.

An idea I have been toying with for some time is electrical power, broadcast like electrical waves on the radio. Each country could have power stations transmitting power in certain directions to connect with stations from other countries, and the air liners and commercial planes of the future would fly along these routes as they fly along a radio beam. The planes would have to have receiving apparatus, of course. In the daily paper to-day American scientists are discussing the merits of a similar source of power, viz., magnetic current.

Perhaps some of your readers will state their views on the ultimate source of power for aircraft.

"TYPHOON."

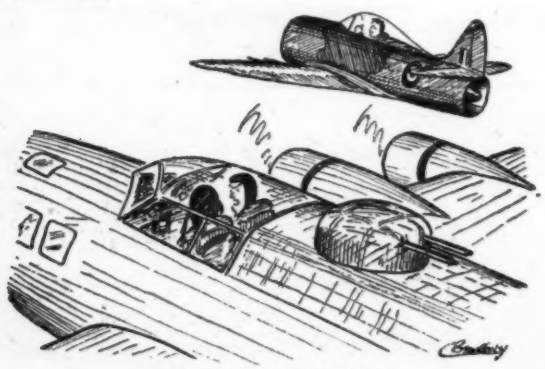
How is Newton's Law Fulfilled?

WILL you oblige by settling an argument regarding jet propulsion? On my side I argue that in order to conform with Newton's laws the forward motion of the aircraft is produced by the gases expelled from the machine impinging on the wall of air surrounding it. Or, alternatively, if air surrounding the aircraft did not resist the expulsion of the gases, thereby producing an equal and opposite reaction which, in effect, is the force producing motion in the aircraft, there would be no motion.

My opponent contends that the main propulsive force, or the reactive force producing motion, is that produced in expelling the gases from the aircraft, thus giving the forward motion; the wall of air, he claims, has little effect. To support this he contends that the jet-propelled aircraft will fly at high speeds at great heights, but this I contend is due to the decreased resistance at these altitudes. He lends further support to his argument by contending that a rocket would propel itself in a vacuum, but this appears fallacious; if there is no reaction to any force, no matter how it is produced, I cannot see how there will be an action or force to produce motion.

"SYWELL."

[Your opponent is correct, but readers may like to give their views.—ED.]



Who's the mug in the glider?

Calculating Thrust

I HAVE read with interest and profit your book on Jet Propulsion, together with recent articles in *Flight*, and I venture to put before you some of my conclusions in the hope that they will inspire further articles from your pen, with, perhaps, more technical information.

One must go back to first principles in order to obtain a grasp of the conditions involved in jet propulsion, and retain firmly in mind that the acceleration of a mass, and its continued motion against resistance, can only result from an equivalent and opposite motion of another mass. The problem must then be examined within its limits, in this case, between motion on or through solids to motion in a vacuum.

The obvious example for solids is a locomotive, which ejects a jet of steel rails behind it whilst imparting an acceleration to the earth: in a vacuum the only forces available are due either to gravity or to the ejection of matter. Between these extremes lie water, and the varying densities of the atmosphere.

One of the earliest known examples of jet propulsion is Hero's turbine, but in more modern times practical tests were made by the Admiralty on jet propulsion for ships, which resulted in failure. In the *Engineer* of January 11th, 1867, Rankine discussed the theory as applied to water, and summed up "That the propeller is the best, other things being equal, which drives astern the largest body of water at the lowest velocity."

In changing from water to air, the density of the medium drops to about one-eight-hundredth, but Rankine's conclusions still hold good, even in a vacuum, although "body of water" should read "mass of air" or finally "mass of ejected matter." This is clear from the basic laws of motion which apply equally to locomotives on rails and rockets in a vacuum.

Thus:

Let M = Mass of object
V = Velocity of object at time t
m = Velocity of ejected matter, water or air
v = Velocity of matter, water or air at time t
then MV = mv (equality of momenta)

from which it can be shown that the energy imparted to each is

$$\frac{m^2v^2}{2M} = \text{energy in object}$$

$$\frac{M^2V^2}{2m} = \text{energy in ejected matter}$$

These are only equal when M = m, at which point the propulsive efficiency at 100 per cent. thermal efficiency is only 50 per cent., since half the energy is wasted in the ejected matter. As m increases and v decreases, so the efficiency increases until m becomes as great as the earth and v practically nil when efficiency is practically 100 per cent.

On the other hand, maximum thrust for a given m is obtained by making v as high as possible.

From the above it follows that at sea level, and low altitudes, the jet area would have to be comparable with airscrew area, as it should deal with an equal mass of air at equal slip speed, and would gain in overall efficiency only by the better utilisation of the total heat of combustion. This explains the better performance of the ejector rings described in *Flight* as applied to rockets, where the rocket jet is made to entrain a mass of free air, and finally to emerge at a much reduced velocity. The design of such series-ejectors is worthy of research, although many data already exist in the possession of steam and air-ejectors for vacuum brakes. Streamline flow is essential until after the final emergence.

At high altitudes, as air density decreases, the lesser weight of air entrained may be compensated by decreased resistance, and propulsive efficiency gained by injecting water into the jet. In a vacuum, of course, there is no resistance and, therefore, no need for propulsion once the required velocity has been attained.

As the air density decreases, the work of compressing air for combustion increases, and a point will be reached when a local store of oxygen should be used. At the same time, control surfaces lose their effect, and will have to be replaced by jets. Indeed, one can visualise the equivalent of a helicopter, using vertical jets in addition to horizontal propulsive jets. Even in the Sikorsky machine the tail-airscrew might advantageously be replaced by a controllable jet, utilising the exhaust from the

CORRESPONDENCE

engine; the amount of the exhaust gases would roughly approximate to the torque. PROJET.

Swansea.

THE CIRCULATION THEORY

A Proven Fact or an Assumption?

I AM an engineer and would like to point out a flaw in the circulation theory of flight. Lift is put down as being dependent on circulation. Theory says this circulation is started—and logic demands it must therefore be maintained—by skin friction. I admit that in the case of a rotating cylinder the cylinder is rotating, but does this necessitate that the fluid should rotate also?

That is point number one. As I said before, it is accounted for by assuming it is due to skin friction. Yet to increase lift you must decrease skin friction. That is point number two. Point three is perhaps the most important. Given that lift is due to circulation and circulation is due to skin friction (two things I do not hold), the working of a rotating cylinder can pretty well be accounted for. Lift derived from an aerofoil is different, however.

In the case of a rotating cylinder you can say that the circulation is started by the moving skin hauling the air with it. But in the case of an aerofoil the skin is *not* moving. So there is no cause for circulation. In fact, due to the top surface being greater than the lower surface, the skin friction should be greater on top than below. This should induce a flow opposite to that usually assumed.

Can any reader inform me as to how these difficulties are overcome by theorists? Also, is the idea of circulation an established fact, proved beyond all doubt, or is it still an assumption? "ENGINEER."

THE DUCTED RADIATOR

How is Negative Drag Obtained?

COULD any of your readers enlighten me concerning the ducted radiator? I read that the radiator on the Spitfire, far from producing extra drag, actually gives enough thrust to more than counteract its own drag.

However, how the heat energy obtained from the cooling system is changed into useful thrust remains a mystery to me. I should be glad if someone would tell me how it is done.

R. D. MORRELL.

THE FEMALE OF THE SPECIES

Mere Man's Compensating Prowess

"INDICATOR" should stick to aeronautics and leave sexology to those who have studied the subject. A perusal of "Man and Woman" by the world-famous sexologist, Havelock Ellis, would have shown him that investigators have discovered numerous differences of physical and mental powers between the sexes which cannot be accounted for by the unproved assumption of possible difference in training, but are clearly innate differences due to physical constitution, biological function, and racial history.

If the sex that cannot reproduce life—that is less gifted in home-making or nursing, and much less decorative to boot—were in addition unable to excel or even equal women in other activities, then man would on balance be altogether inferior!

C. LEA.

WHAT'S IN A NAME?

Dictionary Support for "Raid"

YOUR correspondent "F.R.Ae.S." dislikes the use of the word "raid" to describe an attack by air. My dictionary says that a raid is a "military expedition, a predatory incursion, in which surprise and rapidity are usually relied upon."

Surely, this description is admirably suited to air attacks of all kinds, and particularly to our present-day bombing methods which rely so much upon surprise and short duration with high intensity?

The word "bombardment" is too long and lacks that sense of an adventurous expedition over enemy territory which "raid" seems to indicate. "G.R.Ae.S."

THE CASE FOR THE FLYING BOAT

Amphibians Uneconomical

I AM afraid Mr. Edmunds' letter in the January 13th issue of *Flight* rather overlooks one of the major advantages of the flying boat. As land aircraft get larger and heavier the need for heavier and stronger undercarriages must increase. This increase in non-productive weight can be tolerated for a while, but the time will, and has come, when the weight and complication of the undercarriage mechanism can no longer be regarded as an economical contribution. Furthermore, the braking power required to stop x tons of aircraft in the flying position is enormous.

The solution to this problem is afforded by the flying boat, which requires no conglomeration of machinery for its safe alighting and in which the braking power is supplied gratis by the water surface friction.

It is impossible to combine an undercarriage system in a large flying boat as by so doing one is immediately introducing all the evils from which the flying boat is normally free. I will admit that an economical combination may be effected in lighter aircraft such as the Grumman Goose, but it would only be of practical value on internal flights where water and land airdromes may have to be used on the same flight.

In so far as the convenience of being able to taxy ashore is concerned, I consider the solution to this problem lies in better designed and more easily fitted beaching chassis. The beaching of a flying boat presents no difficulties provided the chassis is well designed and the beaching party experienced.

Mr. Edmunds' suggestion of moving the sponsons of the Boeing is impracticable as the positioning of sponsons is dictated by hydrodynamic considerations too complex to give here.

I hope this short explanation will assist in enlightening Mr. Edmunds and others of one important point, i.e., a flying boat is far superior to a landplane for certain aspects of air transport. Employ it correctly in its proper sphere and the benefits will be appreciable. Employ it incorrectly and after so doing compare its advantages with that of a landplane—and you have the basis of ill-informed criticism.

MARTIN BUTCHER.

AMERICAN BOMBING ORGANISATION

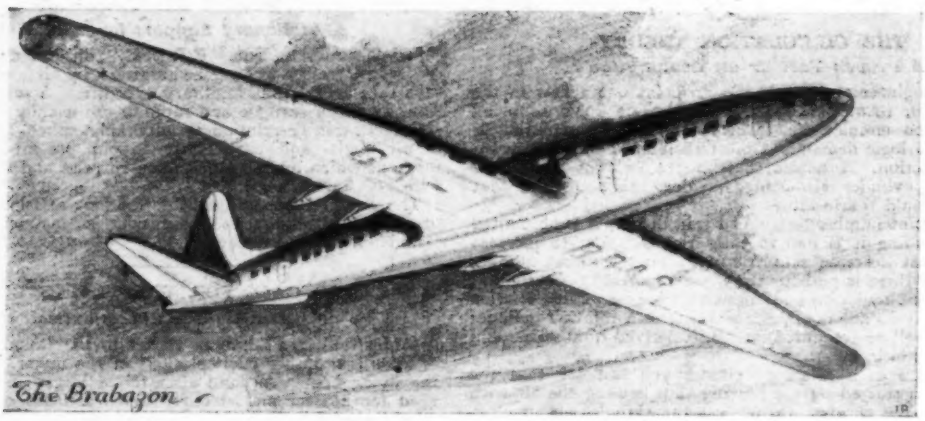
THE appointment of Lt. Gen. Spaatz as commander of the American Strategic Bomber Force against Germany has introduced a new and interesting form of organisation. For the first time forces of heavy bombers in Great Britain and in the Mediterranean are to work under one commander, who is naturally located in Great Britain. Hitherto, between operations in Great Britain and those in the Mediterranean there has been a great gulf fixed, but now they are to work together in one strategic plan. It is a novel idea and a fascinating one to the student of air war. It makes a pincer movement, closing on Germany from north and south.

Some time ago it was announced that the Strategic Air Force in the Mediterranean had been split into two, the 12th and the 15th, and that Maj. Gen. Twining would command the 15th. That is the force which is now working under General Spaatz, though for administration and supplies it still has to look to the Mediterranean Command. The 12th Air Force remains part of the Mediterranean Air Command, and General Eaker has just appointed General J. K. Cannon to command it. Its duties will be of a tactical nature, and another post is being found for Air Marshal Coningham, who had so brilliantly led the old Tactical Air Force in the Mediterranean theatre

The new organisation means that the closest understanding must exist between all members of the U.S. Army Air Force in Great Britain and that of General Twining in the south. All ranks, and ground crews in particular, must understand the workings of their opposite numbers in the combined organisation.

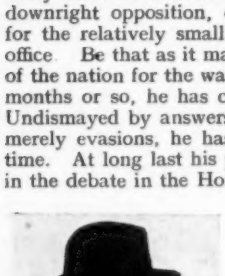
For Germany the prospect is grim. With bases in England and in Southern Italy working in conjunction, there are few places in the Reich which cannot be hit to-day by the heavy bombers of General Spaatz's force. For some time past the services have made a speciality of striking at factories which turn out fighters and their parts, and it has been calculated that already 40 per cent. of the planned production of German fighters has been cut down. Given a run of fine weather, such as is usual in a Mediterranean summer and sometimes occurs in the north-west of Europe, General Spaatz expects that the *Luftwaffe* can be knocked out of business before the end of the present year. If its fighter branch is hamstrung, the rest will obviously follow as a matter of course.

Air Transport . . . . .



Once More the House of Lords Advances to the Attack : Lord Beaverbrook's Statement of Government Policy

FROM the persistence of his demands for a statement of Government policy on post-war commercial aviation, it is beginning to become evident that when he was Air Minister many years ago the Marquess of Londonderry must have been fighting considerable apathy, if not downright opposition, otherwise it is difficult to account for the relatively small progress made during his term of office. Be that as it may, Lord Londonderry deserves well of the nation for the way in which, during the last eighteen months or so, he has continued to prod the Government. Undismayed by answers which were no answers at all but merely evasions, he has returned to the attack time after time. At long last his persistence has been rewarded, and in the debate in the House of Lords on January 19th Lord Beaverbrook, the Lord Privy Seal, did disclose sufficient information about post-war civil aviation to prove not only that he has been "on the job" since he was appointed to take charge, but that he has managed to extract from the Government at least some sort of a tentative policy.



Lord Londonderry.

As Viscount Rothermere said during the debate, it was rather a pity that the reverse procedure could not be followed, the House hearing the Government's case and then debating it. However, even so the debate did produce several new aspects and was far from being a mere repetition of previous debates.

The Marquess of Londonderry, although he did apologise for once more raising the subject of post-war air transport, was considerably more outspoken than on former occasions. "Though I cannot say," he said, "that I have had any actual demonstration of the fact, I am still hoping that the Government really recognise the vital importance of the question of post-war aviation and of civil aviation. And I most sincerely hope that to-day we shall hear something about policy." . . . "I am quite convinced that should we go on without enunciating a policy we may meet many disasters."

He was anxious to receive an answer on certain points, such as the international regulation of civil aviation; the supply of adequate civil transport now; the principles governing British airline operations within the Empire and to foreign countries; the policy of the "chosen instrument"; and, finally, the question of the separation of civil aviation from the Air Ministry. He would not suggest interfering with the war effort, but aviation was most important at this stage, and there were a number of people available for developing plans in many directions.

Lord Londonderry reiterated one complaint which he had previously made: when he read the speeches of members of the War Cabinet and of other eminent people, he noted no reference whatever in them to the air, to the development of post-war aviation, or to the great part which aviation must play not only now but in our post-war policy. On the supply of adequate air transport Lord Londonderry thought that we had aircraft which could not only satisfy war conditions but could fill the gap until the new designs should be in operation. Of operations within the Empire he thought that the whole well-being of the Empire as a great world-wide organisation with a paramount mission to fulfil depended upon the recognition which we gave in the immediate future to the importance of civil aviation.

End Monopoly?

As regards the "chosen instrument," Lord Londonderry recalled that in the debate held in 1939 the circumstances were very different. Power politics were governing the development. He hoped that in future, by an international agreement, power politics would be kept out of this essentially peacetime question. British Overseas Airways Corporation was entitled to a testimony for the remarkably good work it had accomplished, but he felt that the usefulness of this monopoly instrument, which was the "chosen instrument," was coming to an end, and that if we adopted a policy of one "chosen instrument" we should be placing a restrictive influence on all private enterprise. If we were to go away from the principle of one "chosen instrument" it would be necessary to repeal the Act of 1939. This, or at least the announcement that it was the intention of the Government to repeal it later, would enable other companies, both air and shipping, to prepare their plans. He was against subsidies *qua* subsidies, but there were many things the Government could do to assist, such as airport facilities, ground staffs, radio facilities, etc. If Govern-

ment subsidies were to be given, the reasons should be very clearly stated.

Lord Londonderry concluded by referring to the separation of civil aviation from what he termed the "sterilising influence" of Service aviation. It was not for him to say that there should be a separate Ministry for Civil Aviation, but there were such bodies as the Board of Trade and the Ministry of War Transport.

Viscount St. Davids spoke in favour of international agreement and an international company in which all the various countries would be shareholders.

Lord Mottistone pleaded for separating civil aviation from the Air Ministry; not at the moment, but in making plans for the future. His reason was that it was impossible for an Air Minister to take on the whole-time job of controlling the Royal Air Force along with the difficult business of recruiting personnel for a civil air force, providing airfields, aircraft and "the whole gamut of equipment." A civil air force we must have if we were to survive as an Empire. In future, much would depend on our foreign trade. The way to promote foreign trade was to have swift communications, and the way to have swift communications was to have air communications.

Long-term Subsidies

Lord Mottistone thought the great aircraft now used, and to be used in the future, would need Government help for a long time. Whether that help should be a direct subsidy, a postal subsidy, or contributed in all sorts of ways like free airports and so forth, he did not know. That would be for the Minister of the future to decide, but he did believe that no modern aircraft would fly without Government help.

The Duke of Sutherland.

The Duke of Sutherland thought it obvious that the Government could not have a policy until the Empire had come to an agreement with other nations. He did not think any international corporation would win approval. He wanted to know if the Dominions had been promised any Yorks; if not, what did the Government expect them to use? Great Britain had ordered two prototypes, a landplane and a flying boat. The aircraft industry should be freed sufficiently from the present strict control to enable it to accept provisional orders for delivery within a certain period after the cessation of hostilities. He also thought we could press on with some of the detailed preparations while the bigger issues were under consideration, and quoted Col. Drew, Prime Minister of Ontario, as follows:—

> "Post-war commercial aviation is not a subject about which there need be any secrecy at all. Of that I am certain from my contacts on both sides of the Atlantic. On the contrary, the details should be right out in the open for all to read and understand Otherwise there may be serious misunderstandings between those who must work very close together."

Viscount Rothermere did not agree with Lord Londonderry that any aircraft in view at the present time would be in the least adequate for competition such as we should have to meet from other countries. On the subject of private or public enterprise, he hoped that no question of ideology was going to decide whether any service should be a public or a private one. The only question should be which was the best. He disagreed with Lord Mottistone that no air line would be able to operate without a subsidy. He quoted the internal American air lines, but Lord Mottistone intervened to point out that American air mail payments did cover a very large proportion of the cost. Lord Rothermere pointed out that most shipping lines carry mails. The greatest difficulty as regards flying was the initial capital expenditure, but even allowing for this he thought an air line could be made to pay.

Lord Strabolgi thought he detected a slight flaw in Lord Londonderry's speech. One only had to look at a globe to realise that we could not have an independent Empire air service linking up all the scattered colonies and dominions without the collaborations of other nations. In the past many of Imperial airways were artificially routed. The quickest way to India, for example, was not the way we used to fly, and in order to use the quickest route we should have to have the collaboration of the Russians. He recalled the attitude some years ago of the Persian Government, which compelled us to transfer our air route to the other side of the Persian Gulf, and concluded by expressing the hope that "we are not going to tolerate any nonsense of that kind in the future." He suggested there should be some wide international instrument laying down a minimum of flying rights for innocent traffic, otherwise we should only have friction and trouble.

The Lord Privy Seal (Lord Beaverbrook), in replying for the Government, denied that B.O.A.C., the "chosen instrument," was a monopoly. It had a monopoly of subsidies for overseas traffic but nothing else. If other companies, air or shipping, wanted to run air services overseas without subsidies there were no statutory rights of the B.O.A.C. to prevent them.

Continuing, Lord Beaverbrook said:—

"First of all, I am asked what we are doing, what are our plans for civil aviation, and what is our immediate province. Since I spoke last, on October 20th, we have done a very great deal. In the first place, we have been making progress in providing types of aircraft for civil aviation. These are, of course, types suitable for civil aviation, types which can be used and may be used for military transport during the war, but types which are essential for the purpose of providing civil aviation with the necessary aircraft when the war is over. First of all, there is an airplane which is known as the Brabazon. This is a very big project. The all-up weight is designed to be more than 100 tons, with a speed of 250 miles an hour and a capacity for fifty passengers and two tons of mail. The airplane will be scheduled to cross the Atlantic in fifteen hours. The design of the Brabazon has been begun, and the prototypes are actually on order, but do not on that account expect a swift conclusion, because, of course, years must pass before a type so completely new can be brought from the drawing-board to the traffic route. We owe a debt of gratitude to Lord Brabazon and to his colleagues for having laid down the most ambitious aircraft programme so far set in hand in this country.

Interim Tudor

"The Secretary of State for Air and the Ministry of Aircraft Production have taken into account the long time that must elapse before the Brabazon makes its maiden journey, and it is for that reason that a project for another type has been launched. The all-up weight is about 32 tons. You will say that is not much to boast about compared with the Brabazon. But, just the same, it is a very fine plane indeed. This new aircraft will have a cruising speed of 220 miles per hour, will be fitted with de-icing means, and will be constructed in a form suitable for pressurisation. The journey over the North Atlantic in winter as well as summer, with twelve passengers and luggage, will be an easy flight. This aircraft is named the Tudor. Its design is already in hand. The prototypes will be brought out as soon as possible. Preparations for production will be undertaken. If it is ready before the end of the war—and we expect it will be—it will be most suitable for a military transport.

"We are ready at any moment to enter into an international conference. I cannot tell you when it will take place. But in our view when the time comes our first concern will be to gain general acceptance of certain broad principles whereby civil aviation can be made into a benign influence for welding the nations of the world together into a closer co-operation. These principles must assure to all countries a free and fair share in this new means of transportation. No nation, great or small, except of course

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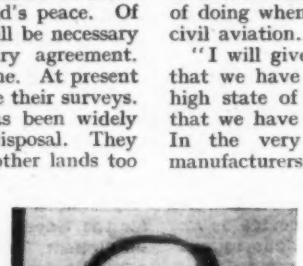
the guilty aggressor nations, must be debarred from taking a full and equitable part in the upsurging development of civil aviation that will follow the end of the war. It will be our aim to make civil aviation a guarantee of international solidarity, a mainstay of the world's peace. Of course, there are vital issues on which it will be necessary for the great Powers to reach preliminary agreement. We are ready for such discussions at any time. At present we are waiting on the Americans to complete their surveys.

"In particular the question of bases has been widely canvassed. We have many bases at our disposal. They are scattered all over the Empire, and in other lands too the needs of war have caused us to construct airfields suitable for peace as well as for war. I do not of course deal to-day with the bases in the Dominions. These are necessarily separately dealt with, but they must and will be a subject for discussion between Great Britain and the Dominions. But as for the bases under our control, let me say at once that the Government have no desire to exclude aircraft of other nations. We demand no prescriptive right to the use of airfields for ourselves. Rather do we mean to use them for the purpose of steadily developing civil aviation throughout the world. Here it must be said that the bases are few in number at which any great volume of traffic can be collected. Just the same, it will be necessary to have international agreement on traffic regulations and arrangements. This is an essential condition of future developments. For my part I find myself on this subject in agreement with Mr. William Burden, of the Department of Commerce in Washington. Mr. Burden, speaking in Washington on January 5th, said:—



Lord Beaverbrook

"'Complete freedom of the air in the present state of the world might result in commercial anarchy.'

"I share Mr. Burden's view. For our part we are prepared and ready at any time to enter into negotiations with a view to disposing of all traffic problems and arrangements that will arise.

"Now the President has recently made certain proposals for the future of international civil aviation. He has declared for the right of innocent passage for all nations throughout the world, and for the right to land anywhere for refuelling and other non-traffic purposes. And I am now authorised by the Prime Minister to say that we join with the President to the fullest extent in subscribing to those principles. I repeat the principles: the right of innocent passage for all nations throughout the world, and the right to land anywhere for refuelling and other non-traffic purposes.

Future Policy

"I am asked by some noble Lords to state what is the future policy of the Government, and I will state it here. It is our intention that the Government shall take a full measure of responsibility for the development of civil aviation when the war comes to an end. That will be our right and our duty, and to the performance of the task we shall bring the vast knowledge of the air and of the aircraft which Great Britain has acquired. For the aircraft, of course, is the weapon above all in this war for which we have shown the swiftest aptitude. We have exhibited the most remarkable capacity for design and development of new types of aircraft. We have manifested the highest degree of engineering skill in bringing production to a state of efficiency. And that is not saying too much.

"I was asked by my noble friend Lord Londonderry to make a statement about the operations of the B.O.A.C. I cannot do so; I am not entirely familiar with the operations of the B.O.A.C.; but this I can say, that it is under able and competent direction. I have had the opportunity of talking to Lord Knollys, and I am convinced that as much as can be extracted from the wise and able direction of the B.O.A.C. will be got from it under his care. But I can tell your Lordships something of the aircraft industry in Great Britain and what the aircraft industry is capable of doing when it comes to dealing with the necessities of civil aviation.

"I will give you one example to make good my claim that we have brought production and development to a high state of efficiency; that is the engine manufacture that we have launched in the United States of America. In the very darkest days of the war our engine manufacturers launched in the United States of America, for the use of the Royal Air Force, the most famous engine in all the world, the Rolls-Royce Merlin. In July, 1940, we launched that project for building the Merlin engine in the United States. (Here let me say that both the Merlin engine and the Spitfire aircraft were got into design and development during the Ministry of my noble friend Lord Londonderry—it affords me particular pleasure to say so—and my noble friend Lord Dowding was responsible for design and development at that time under Lord Londonderry.) That engine was put into production in the United States. New York funds were provided by the Government for the purpose, and these New York funds were taken from the securities of our rich investors abroad. The securities which were so willingly given up at the beginning of the war provided necessary money for the production of the Rolls-Royce Merlin. In fact, we provided something in the neighbourhood of £12,000,000 to £15,000,000. Within twelve months of having signed the contract for the production of these engines we had brought them into existence. The Americans have since adopted that type—the Rolls-Royce type—for some of their fighter aircraft. We read a great deal in the newspapers to-day about fighter aircraft, built in America and engined by engines built in America, but these engines are Rolls-Royce engines, the production which we launched in July, 1940.

Wartime Effort

"I need not tell your Lordships, when giving an account of the capacity of the aircraft industry in Great Britain, that we did not always hold the mastery of the air. In fact, at the outbreak of war, the Germans' strength in aircraft—first-line strength—was as four to one. The Germans had at that time 4,320 operational aircraft in their first-line strength and in addition reserves.

"What then was the result of the labours of the aircraft industry? In the first four months of 1940, before the National Coalition Government was formed, just over 2,700 operational aircraft were provided for the Royal Air Force. You will say that is a good many, but I have told you that the first-line strength of the Germans was 4,320 aircraft. In the next four months—the critical period in British history—when Churchill was Prime Minister, the number was just over 6,400. That is what the aircraft industry performed in that crisis of our history.

"Now what conclusion do I ask you to draw from all this? Just this. That the aircraft industry in Great Britain, which served us so well in the hour of our greatest peril, is capable of performing, when peace comes, a programme of design, development, and production of civil aircraft which will not disappoint the highest hopes of those of us who believe in the dazzling future of civil aviation throughout the Empire. It will not disappoint us, we may trust it. What will be required of us in this peacetime future? We shall need machines, not only for

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the great trunk routes that will link the Empire, but aircraft of smaller sizes for internal and feeder lines. We shall want to operate from the snows of the North to the heat of the Equator.

"How many aircraft shall we need? The question was raised to-day by my noble friend the Duke of Sutherland. He spoke of my having mentioned a figure of 2,000 aircraft. I cannot suggest any figure. I set down that figure of 2,000 aircraft as a tentative proposal, but I cannot really suggest any figure. But I bring to your notice this fact. The Pan-American Airways in 1943 carried twice as many passengers as in 1941, and four times as much mail. That gives us some idea of the rapid growth and development of transportation by air. I give you also the opinion of the Civil Aeronautics Administration in Washington. That American organisation, a Government institution, has made a calculation that American internal airways—that is, lines within the United States of America—will need in 1950 5,000 aircraft. That is more than ten times the number that operated in 1940; in other words ten times more in ten years. Traffic over the North Atlantic is already a common practice. I have seen it stated from New York that at the present time 1,000 aircraft are crossing the North Atlantic in each week—1,000 crossings every week! What will be the volume of Atlantic traffic after the war is over? I would not estimate it, but certainly it must be many aircraft every day as you will easily imagine when you consider that now, during the war, 1,000 aircraft are crossing the Atlantic every week.

Air and the Empire

"Assuredly then there are immense possibilities for civil aviation after the war. Assuredly, too, we are equipped with all the necessary genius for design and development. We possess manufacturing plants and personnel unexampled in efficiency, workmanship and experience. But we have something more as well. We have an Empire in every respect suited to the use of this new means of transport. It is most admirably situated to make use of it. It is widely scattered, separated in its parts by vast distances, by mountains, seas and deserts. All our Empire problems can be made to yield to the new science, the science of transportation by air over sea and over land. In truth, where aviation is concerned, the Third British Empire gives high hope and great promise. We failed to make use of our opportunities before the war. We did not develop our Imperial resources or our vast agricultural wealth in the Colonies. Now there is another chance. Now a new age opens, an age of raw materials, an age when the riches of the Empire require development for the benefit of the whole world, an age when the Empire has a new instrument in the shape of aircraft which can help us to link up, to gather, and above all develop to the fullest extent the essential resources in raw materials for the populations here and abroad, for the men and women everywhere who will be awaiting as soon as peace comes the flow that must take the place of the drought of the past five years.

"We have an Empire that has mastered the art of war and is determined now to master the art of peace, an Empire of solidarity and single purpose with a strength that may not be challenged, holding a justifiable pride in the deeds of its youth, respected by all the nations that will have been freed from bondage, trusted by the United States and by Russia. Our Third Empire will end the war stronger than ever before, firmly established and confidently determined to expand and develop her latent resources and her hidden treasures. And in all our plans and schemes the youths who fought our battles must be our mainstay. The development of the airways of the Empire must be their instrument. The future of civil aviation will be in their hands, and we may safely leave it there."

B.O.A.C.—Present and Future

Lord Knollys Tells the British Public Something of the Work of the British Overseas Airways Corporation

WHETHER by design or accident, it was fortunate that the broadcast talk given on January 17th by Viscount Knollys, chairman of the British Overseas Airways Corporation, coincide within a day or two with the debate on air transport in the House of Lords. Lord Knollys gave a most interesting outline of what the B.O.A.C. has done and is doing during the war, and he gave listeners a glimpse of what they may expect from the Corporation after the war. The talk was timely in that the great British public knows little of what the "chosen instrument" is doing.

Lord Knollys began by pointing out that last year the aircraft of the B.O.A.C. flew 12½ million route miles on its 50,000 miles of air routes. It probably came as something of a surprise to learn that the Corporation employs a staff of 15,000.

A brief reference was made to the part played by the Corporation in flying supplies to Malta during the siege, in the evacuation of Greece, and in bringing up supplies in the Western Desert. The daily work of the Corporation was transport of people and things to and from various centres, flying alongside the aircraft of the Transport Command of the R.A.F. The 3,200 miles between the United Kingdom and Montreal was flown several times a week, sometimes non-stop, but usually with one.

Viscount Knollys.

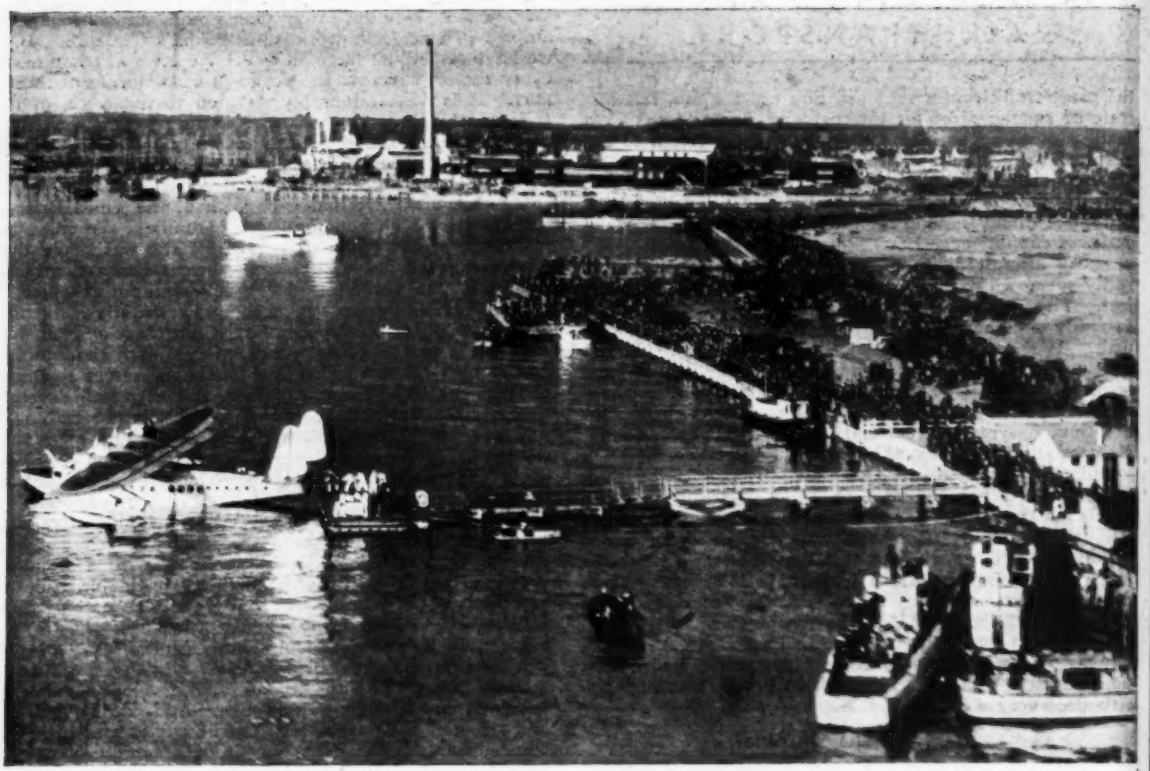
The so-called "horseshoe route," South Africa to India via Egypt, was 8,000 miles long. Other routes were from home to the Middle East and on to India, and across Africa from the Gold Coast to the Sudan. The flying-boat route across the Atlantic was via Newfoundland and sometimes Iceland in the summer, and via West Africa and Bermuda in the winter

Post-war civil aviation, Lord Knollys said, would be important because of the opportunity for personal contact. He pictured an imaginary flight at 20,000 to 30,000ft., cruising at 240 m.p.h.—not at the maximum speed of 350-400 m.p.h. so often quoted—leaving England on a cold January night and looking down ten hours later on the Pyramids. The next day the passenger might be in India or in South Africa. That, Lord Knollys said, sounded like a travel agent's booklet but could almost be done now.

Of the future legislation Lord Knollys said there must be international machinery to settle where aircraft shall fly and where passengers may be picked up and set down, but there must be as much freedom and as few restrictions as possible.

Concerning one or more "chosen instruments" Lord Knollys said that it was not for him to say, but he thought that with our instinct for making apparently illogical schemes work, we should find a practical solution. The B.O.A.C. looked upon itself as trustees for the time being for whoever might be called upon to operate British air services abroad. "We have," he said, "no excessive ambitions to run all air services ourselves—or by ourselves."

After outlining the sort of orthodox aircraft that would be used for non-stop flights from England to Egypt and England to America, Lord Knollys explained that later would come jet-propelled and tailless aircraft, which would make possible flying faster, farther and with more payload, which meant more passengers and lower fares. That, however, was for the future. For the present and for the immediate post-war period there was the York, which was much more than a converted bomber. "It is a very promising transport capable of great work, and I am convinced that it and other models which may be developed from it will stand us in good stead until later advanced types come into action."



Ready-made airport. A pre-war scene at the Baltimore terminus of B.O.A.C. and Pan American Airways.

The Future of the Flying Boat

Structure Weight in Relation to Size Favours Marine Aircraft : Shipping Companies as Flying Boat Operators

By W. P. KEMP

THE AUTHOR of this article is a director and joint general manager of Short and Harland, Ltd., in which concern two of our best-known flying boat and shipbuilders are merged. Before taking up his appointment in Ireland he was for many years a director and works manager of the parent firm of Short Brothers, Ltd.

IN his reply in *Flight* of December 16th to the Saro article dealing with the employment of flying boats, Mr. C. A. H. Pollitt "rushes in where angels fear to tread."

I do not propose to enter the controversy of comparison of structural weight, except to say that it appears obvious that the difficulties of strength, tyre loading, undercarriage mechanism and weight, and length and cost of runways, all increase rapidly with the increase in size of the large land machine. In the case of the flying boat, however, the loading per square foot of planing surface increases only very slightly with increase of size up to almost any limit. Again, reinforced concrete runways are costly to build and maintain, and at least three must be provided of sufficient length, width and thickness at all terminal or intermediate airports to enable safe landings to be made under varying wind directions.

The flying boat, on the other hand, has, generally speaking, unlimited sea, lake or river spaces all over the surface of the globe, and these, in many cases, are ready-made. If they have to be provided near large centres of population, the cost of construction of a lagoon, or enclosed water space, of a depth of, say, 8ft. or 9ft., would probably be no greater than that of building the necessary runways. In some districts where the subsoil is suitable, grading of the bottom and earth embankments with puddled clay cores would be all that would be required to hold the water, and this might conceivably be a lot less costly than making reinforced runways.

Shipping Comparison

The trouble is that lack of vision has resulted in much more thought and money being expended on airfields than on suitable water facilities for flying boats.

Consider the hundreds of millions of pounds which have been spent on the harbours of the world as aids to shipping, and the resulting great industries and centres of population which have grown up round these harbours because of their accessibility to other parts of the world. It is true that this is largely due to cheap transport of bulky goods, but, nevertheless, it is also due in a large measure to the fact that men and women who traverse

THE FUTURE OF THE FLYING BOAT

Canada and the United States of America are well provided with lakes and waterways.

Many places in South America hitherto inaccessible can be reached by flying boats using the big rivers.

the world on their lawful occasions can get quick and comfortable access to them. There is, too, a great need for the rapid transportation of the less bulky and more valuable cargoes, and it is these, with the passengers, which will largely make the future of civil air transport.

Spreading Mankind

The world is as yet very unevenly populated, and climate and inaccessibility are the two main causes. Not many of the people of the earth have any desire to live in the polar regions—we can therefore eliminate them from our survey except for the air above them which in some cases may be used as the medium through which the air liners of the future will fly. In passing, it is agreed that ice on the water is apparently an insuperable difficulty for flying boats, whereas landing strips can be kept clear of snow for land machines, therefore those who wish to travel in very cold regions will probably have to fly in land machines.

We now come to the second point, that of inaccessibility. Why is it that a large percentage of the world's industrial population centres round the seaboard? Obviously this is because people and goods can reach other parts of the globe quickly from these points. Glance at the map of, say, South America with its two great rivers, the Amazon and the River Plate with its subsidiary, the Uruguay, the former running generally from east to west, and the latter roughly from south to north. The distance between their tributaries is not great, and innumerable ready-made bases are available at Manaos and further inland on the Amazon and right up through the Argentine, past Paraguay to Brazil.

Africa, with the Nile running south from the north-east, the Niger running inland from the west coast (with its growing palm-oil industry); and, further south, the Congo, with literally thousands of miles of suitable flying-boat bases. Further east we also have the great African lakes.

The launching and testing of the 70,000 lb. Short G. Class flying boats on the Medway before the war, demonstrated how narrow and winding tidal waters could be used for flying boat operation.

THE FUTURE OF THE FLYING BOAT

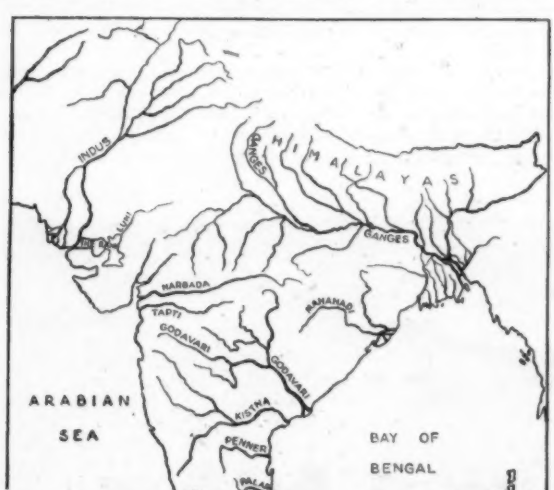
Consider, too, the North American continent with ready-made bases at, to name only a few, Vancouver, Victoria, Seattle, Lakes Michigan, Erie, Superior and Ontario, with centres such as Chicago, Milwaukee, Toledo, Buffalo, Port Arthur, Toronto. The great rivers of China and Russia, which for centuries have been the main means of transport through their vast territories—journeys which took months and can now be done in hours—what vast possibilities there are waiting for someone to grasp.

Who then is going to seize the golden opportunity? Obviously it should be the big shipping companies of the world who already know the potentialities of the districts, and who have already in being much of the organisation required to operate these services at or close to the projected ports of call. They will undoubtedly require technical advice and help from the aircraft industry both as regards the aircraft themselves and the ancillary handling equipment, such as moorings, tenders, slipways, winches, docking facilities and suitable arrangements for transshipping direct from aircraft to steamer.

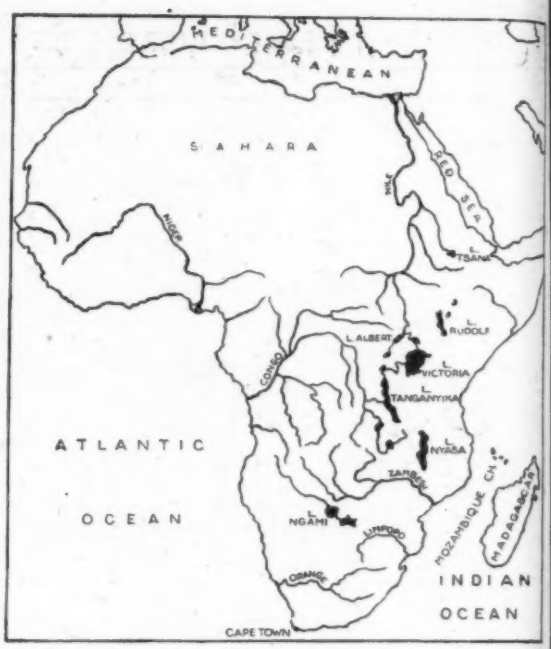
Artistic Commerce

These port facilities can, with advantage, frequently be at some distance from the so-called commercial docks and should be designed on modern lines to suit their surroundings and be æsthetically pleasing to the eye as well as technically efficient. The two are not incompatible, in fact, the one is frequently the complement of the other. One visualises, for Empire travel, many more boats of the 1,500- to 2,000-mile range than those of the 3,000- to 4,000-mile class. For the up-river and interlake services, a range of 1,000 miles would frequently be sufficient, it being obvious that the less fuel required the greater will be the payload in passengers and goods.

So far this article has only dealt with what one might term the branches of the tree. But what of the trunk, the Transatlantic, Mediterranean, Indian Ocean services? Here, over the deep seas, the flying boat always has the advantage and the larger the flying boat is, the greater will be the advantage It is a possibility that a forced landing might sometimes be necessary, although this will become more remote as time goes on. Would one rather



The great rivers of India must provide many ideal alighting areas.



Nothing but flying boat services operating from the big rivers and lakes can ever hope to open up vast tracts of Africa.

make a belly landing in a land machine and take to the dinghies, or would one rather come down in a boat with at least a sporting chance of remaining intact? I know which I would choose. Once the boat is down, it can ride out quite rough seas at its sea anchor with the probability of either being picked up or repairing the fault and getting under way again. Of course there are days when it would be impossible to come down safely, but there are undoubtedly many on which a safe landing could be made.

Time is important, but do not let us get the perspective wrong. If one proposes to go to the West Indies, South America, or, say, the Malay States from the Midlands, does it really matter much if one spends a few extra hours at the start in arriving at the port of departure? In any case the extra time will only be the time of transhipping from one aircraft to another, as there will most certainly be a system of feeder lines from inland towns to the Transcontinental departure airport or flying boat harbour.

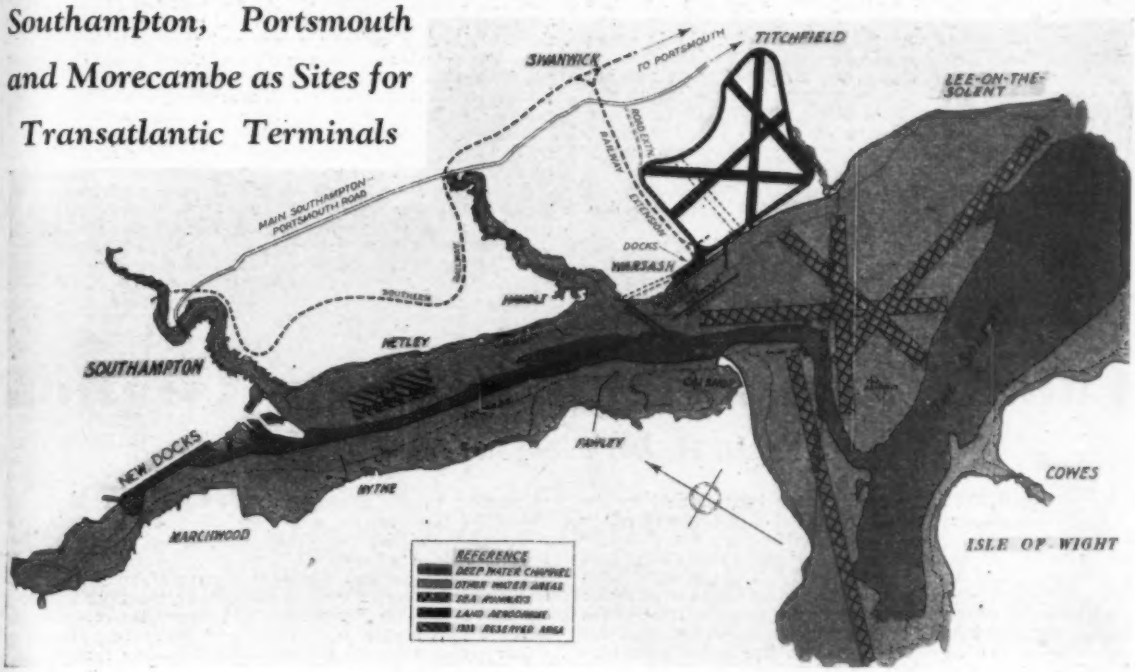
One could enlarge on the obvious fields—or shall we say seas and rivers—waiting for the coming of properly organised flying boat services. The Caribbean Sea circuit, for instance, which includes such call stations as British Honduras, Bahamas, Jamaica, Trinidad, to Georgetown in British Guiana. The Mediterranean Sea also offers innumerable opportunities for flying boat routes. Then there is the whole of the East Indies from the Malay States up to the Philippines and down to Australia.

All these and hundreds of other places are only waiting to be included in organised air routes. The great shipping lines require vision, faith in the future, and the knowledge that, in the post-war era, they can again play their legitimate part in fostering world trade and the further consolidation of our Empire.

Nothing has been said here about the magnificent work done by Imperial Airways and B.O.A.C. Far be it from me to belittle the fine pioneering work done against heavy odds with far too little encouragement—they, after all, were the pioneers of the flying boat for Empire routes and to them must be given much of the credit for bringing the British flying boat to the forefront of the world's marine aircraft. Their long and arduous apprenticeship will surely reap its just reward in the grand trunk Empire routes of the future.

Three Proposed Airports

Southampton, Portsmouth and Morecambe as Sites for Transatlantic Terminals



The land and water airport facilities suggested in the Southampton scheme.

PROPOSED schemes for the construction of combined land and sea airports at Southampton and Portsmouth were announced in "Here and There" in last week's issue of *Flight* under the sub-heading of "A Tale of Two Airports."

It was mentioned also that some rivalry between the two projects would appear to be likely, since the Southampton Harbour Board, in its brochure on the subject, intimates that its own projected airport would be conveniently situated to serve Portsmouth as well as Southampton. It was also pointed out that any such rivalry may be conditioned by the fact that part of the land embraced in the Southampton scheme happens to be under the jurisdiction of the Portsmouth Planning Authority.

Flight will not, at this juncture at any rate, voice any opinion on the merits of the respective schemes, or on the priority claims which may be made by the two authorities concerned; it will content itself with giving such details of the two projects as have so far been announced by their respective sponsors.

But in addition to the purely local aspect of rival airport schemes in close proximity to each other, competition on a wider basis would also appear to be inevitable since both authorities see in their projects an Empire air base and trans-atlantic terminal. And they are not alone in this, for news of yet another proposed transatlantic and trans-continental air base for post-war land and seaborne aircraft has been announced at Morecambe. Doubtless there will be many others.

North-West

Reviewing these three projected civil air bases in alphabetical order, the Morecambe scheme was outlined by Mr. Ellis Smith, M.P. for Stoke-on-Trent.

His scheme generally is to construct a Dutch dike, breakwater, or causeway, which will be ten miles in length, extending from Morecambe to the most easterly tip of the mainland near Barrow-in-Furness. Some four or five Lakeland rivers drain into the bay, and as the Lake District has the heaviest rainfall in Britain, these would provide a heavy run of water for hydro-electric power for smoke-free townships and factories. The bay is shallow across its full width from Lancashire to the West Cumberland coast.

Mr. Smith suggests that there should be a wide motorway, a railway and a promenade along this ten-mile causeway. It would mean reclamation of more than 50 square miles of land in and around the bay, that the feeder streams could be canalised and their flow used for big hydro-electric plants. The latter would be available for new industries, modern aircraft works and electric traction. Here could be a huge airfield and a sheltered basin for flying boats. Already the main west coast railway skirts the bay, and parallel to this runs the main road transport route northward over the Shap summit to Carlisle and Scotland. His plans also include an alternative to the Shap road route.

The airport would have several advantages scarcely available to other sites in the United Kingdom, he claims—an almost ideal approach, freedom from fogs and mists and smoke belts, proximity to the busy industrial north where most of Britain's big factories are located. It is also pointed out that such an air terminal as Morecambe Bay would save over 500 air miles on the return trip to North America as compared with London, and it is nearer than pre-war Croydon to such important Continental airports as Amsterdam, Berlin, Stockholm, Prague and Moscow.

South Coast

Langstone Harbour is the proposed site of the Portsmouth air base, and the city engineer has made a model for the inspection and consideration of members of the council. This shows how the harbour could be dammed by three barrages and converted into a lake, giving a constant water level for flying boats.

Portsmouth city engineer also proposes to reclaim land at the Farlington Marshes on the north shore of the harbour, to provide accommodation for land-based aircraft, hangars and factories.

The council have decided that the Lord Mayor and Councillor F. G. H. Storey, chairman of the Airport Sub-commission, should interview the Director-General of Civil Aviation before they go further into details of the scheme.

Coming finally to the Southampton project, it is stated in the brochure issued by the Harbour Board that the aim is "to provide in Southampton accommodation for civil aviation comparable to that which has been provided for shipping," and it reminds its readers that in pre-war days the port "was the

THREE PROPOSED AIRPORTS

terminal for the Empire seaplane air services and for certain preliminary transatlantic crossings made by the American 'Clippers.'"

Reference to the accompanying sketch plan clearly shows the proposed site of the combined land and sea air base. It was decided upon after considering all possible combinations of water and land sites. The water area is at the conjunction of Southampton Water and the Solent with the adjoining land bordered by the River Hamble on the north-west and the River Meon on the south-east. This water area, the brochure stresses, is open for easy approach and take-off, yet is sheltered by the Isle of Wight. Runways of 2½ to 5 miles, and of adequate width, can be marked out clear of the main shipping channel and with ample water depth.

In order that flying boats may have safe harbourage for mooring, it is proposed to build breakwaters with openings of adequate width for aircraft of large wing span, while within the harbour and along the foreshore there would be covered docks with pontoon landing stages for passengers, slipways, hangars, workshops and similar servicing and maintenance facilities.

Advantages enumerated for the adjacent site of the airfield are many. It is mainly farmland and very free from obstructions. It is of a gravelly nature and thus suitable for first-class runways which, thanks to the easy slopes, could be worked out in a wide variety of possible patterns, leaving room for future extensions if necessary. The area has no violent undulations calling for heavy engineering works, and the average level is sufficiently high above sea-level to facilitate drainage. Being contiguous to the water area, most if not all the services could be shared by land and water-borne aircraft.

A branch railway line of about four miles is suggested from the air base to the Southern Railway Southampton-Portsmouth line, thus connecting with the main-line services to Waterloo and Victoria, and the main road between Portsmouth and Southampton could also be connected at one or more points. Gas, electricity and water supplies are conveniently handy, and there is an adequate supply of gravel for making cement immediately adjacent to the site.

Colour and Design in Civil Aviation

Schemes to Fit All Heights and Latitudes by Day or Night

A CONSULTATIVE committee has been formed by the British Colour Council to advise on the use of colour and design in civil aviation. The view taken by the committee is that aircraft can, in the future, play a large part as potential "ambassadors of industry." There is every possibility that an endeavour will be made to increase tourist traffic to this country after the war, and British airports, those in the Empire and particularly those in foreign countries, could become "show windows" of British culture and "sales windows" of British products. It therefore becomes essential that the decoration of aircraft, airports and terminal hotels should be of the highest possible standard.

An exhibition now staged at the Royal Academy, London, and remaining open until February 27, is devoted entirely to this subject. The central feature of the exhibition is a mock-up interior of a typical post-war passenger aircraft in which the recommendations of the committee have been given practical interpretation.

The basic colour scheme has been evolved to provide, as far as possible, a pleasing atmosphere under all conditions of flight. Soft, restful colours which will look cool in the tropics yet not appear cold for the northern routes, are the staple foundation, and on this can be played varying tones of lighting for different flight conditions. The aims governing the colour scheme devised are: (i) the elimination of boredom on long-duration flights, (ii) the reduction of the psychological tendency towards airsickness, and (iii) the utility value of the colours, ease of keeping clean, freshness, etc.

The seats are finished in a grey/green soft fabric with leather trimming of a deeper tone, and the close short-pile carpet is coloured a pleasant sage-green. The roof of the compartment is ceiled in a neutral beige cloth, and contrasting touches of colour are provided by the night flight window curtains of a red-rust hessian fabric.

For sub-stratosphere or tropic flying in conditions where the sunlight is very brilliant, thin, translucent, pale sage blinds can be lowered over the windows.

Much attention has been paid to the lighting scheme, which consists of a flush panel of tinted and frosted perspex running the length of the cabin in the centre of the roof. This panel provides a soft fluorescent light which illuminates the cabin but not the roof. In contrast to this, subdued coloured light is played on the upper wall and roof curve from a pelmet running above the cabin windows on each side.

The walls are surfaced up to the base of the windows in a dado of leather similar to that used on the seats, and above this is the beige-grey fabric which is continued into the ceiling.

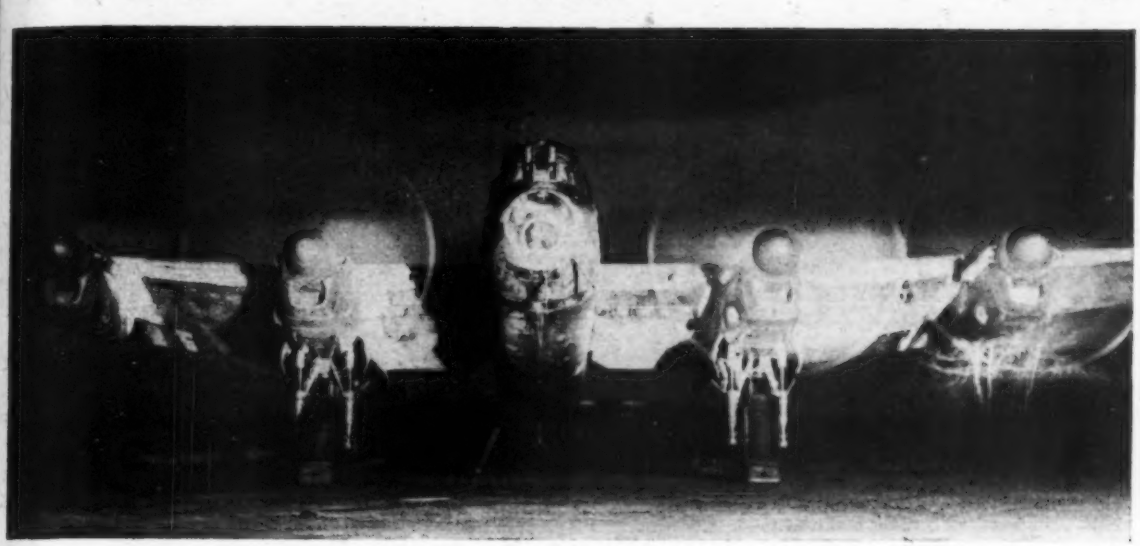
The remainder of the exhibition is devoted to illustrative wall panels divided into eight main subjects: (i) air transport and its effect on post-war trade; (ii) design and decoration of aircraft interiors; (iii) a scientific approach to passenger comfort; (iv) the use of plastics in aircraft interiors; (v) airport design and the use of colour; (vi) flight under extreme climatic conditions; (vi) safety; (viii) the elimination of psychological causes of airsickness.

An interesting exhibit is a circular map, 6ft. in diameter, on sand-blasted and coloured glass. In the centre is a miniature of the same map 1/14th the area. This has been devised to illustrate in pictorial form the "shrinkage" of the globe as a result of air transport at modern ranges and speeds.

Another cartographical feature which is of interest is a plane surface map of the world on which air-routes are marked—curving from this is a perspex cylinder on which corresponding meridians of longitude and parallels of latitude are engraved, and carried within the cylinder is a globe of comparable equator. From this exhibit it is extremely easy to see the distortion occasioned by Mercator's projection.

This exhibition should prove to be of great interest to the lay public as well as to those persons connected with the aircraft industry, and any committee or concern whose object is the enhancement of British aviation is deserving of the warmest support.

The mock-up cabin interior at the British Colour Council's exhibition.



RUNNING-UP: An Avro Lancaster lit up by the Chancelight as its Merlins are tested before taxying to the take-off point

SERVICE AVIATION

Royal Air Force and Fleet Air Arm News and Announcements

Burma Awards

THE KING has been graciously pleased to approve the following awards in recognition of gallant and distinguished service with the R.A.F. during the operations in Burma from May 21st, 1942, to June 20th, 1943:—

M.B.E. (Mil.)

F/O. A. H. JANE, R.A.F.

Distinguished Flying Cross

Flt. Lt. I. O. O'NEILL, R.A.F.O.
F/O. W. D. WEBSTER, R.A.F.V.R.

Distinguished Flying Medal

Flt. Sgt. E. G. WHYTE, R.A.F.
Sgt. J. R. GAMBLES, R.A.F.
Sgt. P. J. HOLLAND, R.A.F.V.R.
Sgt. E. M. GEORGE, R.A.F.V.R.

B.E.M. (Mil.)

Sgt. G. MORRIS, R.A.F.V.R.
Sgt. A. G. WILLSHAW, R.A.F.V.R.

THE KING has been graciously pleased to approve the following awards in recognition of gallantry and devotion to duty in the execution of air operations:—

Distinguished Service Order

Flt. Lt. E. KINSELLA, R.A.F., No. 88 Sqn.—This officer has completed a very large number of sorties, and has displayed skill and courage of a high order. In spite of several trying experiences, his keenness for operations remains unabated, and his unconquerable spirit of determination and unswerving devotion to duty have set an example which has inspired all.

Flt. Lt. E. A. BLAND, R.A.F.V.R., No. 86 Sqn.—Flt. Lt. Bland and F/O. Burridge were pilot and navigator respectively of an aircraft which attacked a U-boat. In the face of fierce anti-aircraft fire, Flt. Lt. Bland pressed home his attack, passing over the submarine at a height of 50 feet. The aircraft was extensively damaged, however, but Flt. Lt. Bland, displaying great resolution, executed another attack. Soon afterwards he was compelled to bring his badly damaged aircraft down on to the sea. Flt. Lt. Bland and F/O. Burridge, who throughout the fight had co-operated splendidly with his pilot, displayed courage and determination of a high order.

Bar to Distinguished Flying Cross

Act. Sqn. Ldr. G. W. SCORER, D.F.C., R.A.F.V.R., No. 619 Sqn.—As flight commander this officer has inspired the crews under him by his splendid example. He was captain of one of the crews specially selected for the attack on Friedrichshafen in June, 1943. In September, 1943, he was again selected for a hazardous and difficult operation. In spite of bad weather, his aircraft reached the target on time and he showed great keenness and determination during the attack.

Flt. Lt. P. C. BIRCH, D.F.C., R.A.F.V.R., No. 50 Sqn.—This officer has completed an outstanding second tour of operational duty during which he has continued to display exceptional zeal, initiative and determination. Several times his aircraft has been attacked and damaged by enemy fighters, but each time owing to his skilful airmanship Flt. Lt. Birch has succeeded in flying safely back to base.

Flt. Lt. J. WRIGHT, D.F.C., R.A.F.V.R., No. 86 Sqn.—This officer has done consistently well on operations. In October, 1943, he was captain of an aircraft which succeeded in sinking a U-boat and assisted in the destruction of another. In difficult circumstances Flt. Lt. Wright showed leadership and initiative in bringing another aircraft to the scene of the attack, thereby enabling the operation to be brought to a successful conclusion.

Distinguished Flying Cross

F/O. B. B. BURRIDGE, R.A.F.V.R., No. 86 Sqn.—For citation see Flt. Lt. Bland, D.S.O.

Sqn. Ldr. E. H. O'Neill, D.S.C., D.F.C., who has been awarded the D.S.O.

Act. Flt. Lt. J. H. TROBE, R.A.A.F., No 10 Sqn.—For citation see Sgt. Bisby, C.G.M.
F/O. D. G. BALDWIN, R.C.A.F., No. 5 (R.C.A.F.) Sqn.
F/O. W. S. G. NUTTER, R.C.A.F. No. 5 (R.C.A.F.) Sqn.
F/O. E. LaP. ROBINSON, R.C.A.F., No 145 (R.C.A.F.) Sqn.
W/O. 2nd Cl. C. W LANDALE, R.C.A.F., No. 5 (R.C.A.F.) Sqn.
Act. Flt. Lt. P. P. SIEBERT, R.A.A.F., No 10 Sqn
F/O. H. A. ASHTON, R.A.F.V.R., No. 83 Sqn
F/O. J. M. BEZER, R.C.A.F., No. 612 Sqn.
F/O. J. P. BLACKIE, R.A.F.V.R., No. 100 Sqn
F/O. E. J. BOWN, R.A.F.V.R., No. 138 Sqn.
F/O. P. CAMPBELL, R.C.A.F., No. 419 (R.C.A.F.) Sqn.
F/O. R. CRAWFORD, R.A.F.V.R., No. 100 Sqn.
F/O. L. W. CRUM, R.A.F.V.R, No. 100 Sqn.
F/O. F. R. DAVIES, R.A.F.V.R., No. 201 Sqn
F/O. C. A. S. DREW, R.A.F.V.R., No. 83 Sqn.
F/O. F. G. FRAY, R.A.F.V.R., No. 542 Sqn.
F/O. D. HARTUNG, R.A.F.V.R., No. 44 Sqn.
F/O. J. G. HUMPHREYS, R.A.F.V.R., No. 156 Sqn.
F/O. J. G. HUTCHEON, R.A.A.F., No. 166 Sqn.
F/O. K. E. INGRAM, R.C.A.F., No. 467 (R.A.A.F.) Sqn.
F/O. P. J. MACAVOY, R.N.Z.A.F., No. 224 Sqn.
F/O. W. H. S. MARTIN, R.A.A.F., No 455 (R.A.A.F.) Sqn.
F/O. M. A. MORTIMER, R.A.F.V.R., No. 540 Sqn.
F/O. A. P. W. PEPPER, R.A.F.V.R., No. 97 Sqn.
F/O. R. P. PEPPERDINE, R.A.F.V.R., No. 179 Sqn.
F/O. A. F. PETHICK, R.A.F.V.R.
F/O. G. R. D. SHERWELL, R.A.F.V.R., No 53 Sqn.
P/O. F. H. FITZJOHN, R.A.F.V.R., No. 120 Sqn.
W/O. J. KENYON, R.A.F.V.R., No. 86 Sqn.
W/O. A. F. SHIMMIN, R.A.F.V.R., No. 236 Sqn.
F/O. R. H. SMITH, R.A.F.V.R., No. 149 Sqn.
F/O. D. S. SYMONDS, R.A.A.F., No. 467 (R.A.A.F.) Sqn.
P/O. G. F. BAKER R.A.A.F., No. 467 (R.A.A.F.) Sqn.
P/O. C. BERNSTEIN, R.A.F.V.R.
P/O. R. B. BERWICK, R.A.F.V.R., No. 35 Sqn.
P/O. R. CARTWRIGHT, R.A.F.V.R., No. 207 Sqn.
P/O. G. T. GILBY, R.A.F.V.R., No. 78 Sqn.
P/O. W. C. GORDON, R.A.A.F., No 460 (R.A.A.F.) Sqn.
P/O. A. K. T. GRAHAM, R.A.F., No. 10 Sqn.
P/O. K. A. KING, R.A.F.V.R., No. 207 Sqn.
P/O. J. K. LIVINGSTONE, R.A.F.V.R., No. 9 Sqn.
P/O. T. V. MCCARTHY, R.A.A.F., No. 156 Sqn
P/O. T. A. ROBSON, R.N.Z.A.F., No. 35 Sqn.
P/O. H. C. THORN, R.A.F.V.R., No. 156 Sqn.
P/O. C. J. USHER, R.C.A.F., No. 467 (R.A.A.F.) Sqn.
W/O. H CROSS, R.A.A.F., No. 166 Sqn
W/O. A. C. EVANS, R.A.A.F., No. 102 Sqn

Conspicuous Gallantry Medal

Sgt. T. F. BISBY, R.A.F.V.R., No. 10 Sqn.—One night in November, 1943, Flt. Sgt Mowatt and Sgts. Bisby and Bridge were mid-upper gunner wireless operator and flight engineer respectively in an aircraft piloted by Flt. Lt. Trobe and detailed to attack Dusseldorf. During the operation

SERVICE AVIATION

the aircraft was subjected to a series of attacks by four fighters. In these actions the bomber was repeatedly hit. The rear turret, the hydraulic gear, the inter-communication system, the wireless apparatus and other important equipment were rendered unserviceable. Flt. Sgt. Mowatt and Sgts. Bisby and Bridge were wounded. In spite of this, Flt. Lt. Trobe succeeded in flying clear. Two of the bomber's engines had failed, but Sgt. Bridge succeeded in restarting one of them. He afterwards extinguished a fire which had started near one of the turrets and later assisted Flt. Sgt. Mowatt to quell another fire which had commenced in the fuselage. Meanwhile, Sgt. Bisby, although in considerable pain, had remained at his post throughout the encounters, and worked unremittingly to effect a temporary repair to his wireless apparatus. He succeeded in obtaining a fix which proved of material help in enabling his pilot to set course for home. Later on, his wireless apparatus again failed, but, although on the point of collapse, Sgt. Bisby continued his task of repairing it. By a superb effort Flt. Lt. Trobe succeeded in reaching base and, in difficult circumstances, effected a masterly landing.

Distinguished Flying Medal

Flt. Sgt. W. MOWATT, R.A.A.F., and Sgt. R. C. BRIDGE, R.A.F.V.R., both of No. 10 Sqn. For citation see Sgt. Bisby, C.G.M.
Sgt. I. D. WALLACE, R.A.F.V.R.
Sgt. G. H. THOMSON, R.C.A.F., No. 5 (R.C.A.F.) Sqn.
Sgt. A. BARFOOT, R.A.F.V.R., No. 207 Sqn.
Sgt. W. W. G. CALDERHEAD, R.A.F.V.R., No. 467 (R.A.A.F.) Sqn.
Sgt. R. MARKS, R.A.A.F., No. 166 Sqn.
Sgt. D. L. MILL, R.A.F.V.R., No. 161 Sqn.
Sgt. K. MITTON, R.A.F.V.R., No. 100 Sqn.

Roll of Honour

Casualty Communiqué No. 335.

THE Air Ministry regrets to announce the following casualties on various dates. The next of kin have been informed. Casualties "in action" are due to flying operations against the enemy; "on active service" includes ground casualties due to enemy action, non-operational flying casualties, fatal accidents and natural deaths.

Of the names in this list 113 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—Sgt. R. V. Downs; Flt. Sgt. B. Holdsworth; Sgt. A. J. Oudinot; Act. Flt. Sgt. F. W. T. Routledge; Sgt. C. E. Smith; Sgt. R. J. H. Steele; Flt. Sgt. C. Telfer.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. H. Buxton; Sgt. W. P. D. Chapman; Sgt. B. J. F. Crook; F/O. J. R. De La Croze; Sgt. G. W. Hancock; Sgt. S. R. O. Hermon; P/O. I. R. Hillan; Sgt. D. R. Jeffrey; Sqn. Ldr. J. Latimer, D.F.C.; Sgt. W. T. McLean; Sgt. F. Morton; Sgt. A. Notley; Sgt. J. P. O'Keeffe; Sgt. P. Perry; Sgt. G. C. W. Warren; Flt. Sgt. T. G. Wood.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. R. J. Amos; P/O. G. E. Andrews; Sgt. A. J. A. Bartle; Flt. Sgt. R. Bartolotti; W/O. S. N. Beckett; Sgt. G. Birch; Sgt. A. C. Blaber; Sgt. D. E. J. Boland; F/O. S. S. Brand; Sgt. F. J. Bray; Sgt. J. Buntin; Sgt. K. H. Chapman; Sgt. E. J. Cook; Sgt. J. J. Costello; Flt. Lt. W. T. Dean; Sgt. R. E. Debben; Flt. Sgt. J. H. P. Dwyer; Sgt. S. F. Essen; Sgt. R. D. Foley; Sgt. W. N. Forth; Flt. Sgt. K. D. Franklin; Flt. Sgt. C. H. Garner; Sgt. J. S. Garnham; Sgt. A. Grant; Sgt. W. D. Gray; Sgt. J. Greenwood; P/O. W. W. Griffin; Sgt. A. Healey; Flt. Sgt. E. C. Hibburt; Flt. Sgt. T. B. Hill; Flt. Sgt. G. A. Hinshelwood; Sgt. R. L. Hunt; W/O. D. W. Jefferis; Flt. Sgt. J. M. C. Johnsen; F/O. L. J. Johnson; Sgt. W. Johnson; Sgt. A. F. C. Kensett; Sgt. R. F. Knight; F/O. L. S. Knott; Flt. Sgt. A. G. Lewis; F/O. W. J. Locke; Sgt. D. C. McIntyre; Sgt. R. A. Matthews; Flt. Lt. R. F. Milne; Sgt. J. C. Owen; Sgt. J. G. Potts; Sgt. M. F. Roberts; Sgt. F. N. Robinson; Sgt. H. W. Sawkings; Sgt. P. Smart; Sgt. N. F. Smethurst; Sgt. C. Thorpe; P/O. M. E. Walsh, D.F.C.; Sgt. E. Wilkins.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW REPORTED KILLED IN ACTION.—F/O. L. W. Kirby.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED IN ACTION.—Sgt. A. A. Ross.

WOUNDED OR INJURED IN ACTION.—P/O. W. H. Baker; Sgt. T. Gedling; Act. Sqn. Ldr. H. Shannon.

MISSING, BELIEVED KILLED IN ACTION.—F/O. J. D. Hassell; Sgt. S. Siddle; Flt. Sgt. M. C. Thomas.

MISSING.—Sgt. H. E. E. Attwood; Sgt. L. Austin; Sgt. R. W. Bailey; Sgt. W. A. J. Baldwin; Act. W/O. A. Berry; A/C.1 A. S. Berryman; Sgt. D. Bigmore; Flt. Lt. A. F. Brazenor; Flt. Sgt. S. G. Brockway; Flt. Lt. H. G. J. Coddington; A/C.1 R. Collins; Sgt. A. A. Copeland; Sgt. J. R. Cowen; Sgt. G. N. Cox; Flt. Sgt. R. O. Ellis; Flt. Sgt. A. F. Evans; Sgt. H. W. Fell; L.A/C. W. P. Ferguson; Sgt. W. E. Finbow; Sgt. J. C. F. Fleming; Sgt. M. F. Flynn; Sgt. J. A. Gartland; Sgt. L. Grimwood; W/O. H. J. Hansell; Flt. Sgt. G. L. Hart; F/O. J. S. Hayden; Cpl. E. C. Hodgson; Sgt. G. H. C. Horne; Act. Flt. Lt. L. D. Hosking; Cpl. E. A. Howes; F/O. W. C. H. Johnson; L.A/C. T. L. Jones; P/O. N. L. Keeble; L.A/C. A. E. Kitch; Sgt. H. Law; L.A/C. H. Lee; Cpl. D. Lindsay; Flt. Sgt. E. J. Lovell; L.A/C. R. W. McGarvey; L.A/C. J. McPherson; A/C.1 F. J. Marshall; Flt. Sgt. R. J. Money; Sgt. L. Morgan; Sgt. S. V. Parker; Sgt. H. W. Payne; Sgt. W. Phipps; F/O. N. G. Price; Sqn. Ldr. G. W. Prior, D.F.C.; Sgt. F. H. Mitchell; A/C.2 A. Rylands; Flt. Sgt. J. D. Sheeran; Sgt. E. H. Shimeild; Sgt. K. Skidmore; L.A/C. W. Smith; A/C.2 L. S. Stallworthy; Flt. Sgt. R. W. Stiff; Sgt. F. O. Stoney; L.A/C. A. Storey; Sgt. J. E. Taylor; Sgt. R. J. Thomas; Act. Flt. Sgt. A. J. Thomson; Flt. Sgt. L. J. Thompson; A/C.1 J. Varley; F/O. H. Wardle; F/O. D. Wood; Sgt. G. A. Wright.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Sgt. W. Collingwood; Sgt. W. C. Plumber.

KILLED ON ACTIVE SERVICE.—F/O. T. N. Alderdice; L.A/C. A. D. Aslett; F/O. F. A. Barr; F/O. D. C. Blair; Cpl. A. J. A. Burrows; Sgt. L. E. Cable; Flt. Sgt. D. F. Carter; F/O. K. Chapman; Sgt. W. D. Cole; L.A/C. J. J. Crockett; A/C.2 W. Fairhurst; P/O. J. Fenner; A/C.2 A. Fraser; Sgt. G. P. Fuller; Sgt. R. T. Gibson; A/C.2 H. A. Grayston; A/C.1 W. T. Haley; L.A/C. J. McK. Hall; A/C.1 J. G. Lambert; Sgt. G. V. B. Lloyd; Cpl. L. A. Manners; F/O. W. R. Matheson; Flt. Sgt. L. G. Mayhew; Sgt. K. Rawlin; Sgt. D. Sharp; A/C.1 J. W. Shufflebotham; Sgt. G. A. Webster; Sgt. R. L. Williams; A/C.1 L. J. Willows.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. D. A. Brown; P/O. C. W. H. Cocks; Sgt. J. Doran; Sgt. T. J. Henry; F/O. C. Jackson; Flt. Lt. R. F. Lind; Sgt. J. A. W. Warrington.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW REPORTED KILLED ON ACTIVE SERVICE.—Sgt. J. H. Newton.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Flt. Sgt. S. W. Oman; Sgt. A. B. Selby.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Sgt. D. W. Pike.

DIED ON ACTIVE SERVICE.—Sgt. H. H. Airey; L.A/C. A. L. G. Banner; Act. Flt. Lt. S. S. Booth-Russell; A/C.1 C. Bullock; Cpl. S. Clegg; A/C.2 V. Cocker; Flt. Lt. J. J. Gale, D.F.M.; Act. Flt. Sgt. H. Gold; Flt. Lt. L. D. Jennings; Sgt. F. E. McCartney; L.A/C. C. B. Ratcliffe; A/C.2 R. D. Reynolds; L.A/C. H. T. Roper; Sgt. R. Ruston; Sgt. R. M. Saunders; L.A/C. J. L. Smith; L.A/C. C. H. Smitherman; Sgt. W. K. Taylor; A/C.2 H. O. Walmsley; Sgt. R. F. Young.

Flt. Sgt. Eric Moore of No. 105 Squadron, who now has the D.F.M. for taking an outstanding share in low level attacks over Western Germany.

Women's Auxiliary Air Force

DIED ON ACTIVE SERVICE.—A/CW.2 H. Muggleston; S/O. R. P. Watson; A/CW.1 J. K. Woollard.

Royal Australian Air Force

KILLED IN ACTION.—Flt. Sgt. L. A. Fox; Flt. Sgt. J. Harper.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Act. Flt. Lt. N. T. G. Beacham; Flt. Sgt. D. H. V. Charlick; Flt. Sgt. E. N. Cooper; Flt. Sgt. G. V. Hampton; F/O. T. H. McNeill.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. G. Arnold; Sgt. R. A. Barton; Sgt. J. C. Bell; Flt. Sgt. R. J. Carrodus; Sgt. A. R. Cope; F/O. E. C. Crapp; F/O. G. F. Davey; Sgt. A. A. Dey; Sgt. G. W. Durdin; Flt. Sgt. E. C. Ebbot; F/O. F. B. Hawkins; F/O. J. G. Johnson; Flt. Sgt. E. R. King; F/O. H. Riding; Sgt. R. F. R. Sides; Flt. Sgt. J. B. Sullivan; Flt. Sgt. J. N. Williams.

MISSING.—P/O. R. W. Daniel; Sgt. N. W. Dowie; P/O. A. G. Harris; Flt. Sgt. W. W. Johnston; P/O. S. J. Lucas; Flt. Sgt. C. P. North; Flt. Sgt. F. W. Smily.

KILLED ON ACTIVE SERVICE.—Flt. Lt. R. G. Fox; Flt. Sgt. S. H. C. Thrower; Flt. Sgt. C. J. Walsh.

Royal Canadian Air Force

KILLED IN ACTION.—Flt. Sgt. W. D. Scott.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—P/O. E. R. Seibold.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. H. B. Einarson; Flt. Sgt. J. Glover; Flt. Sgt. A. L. Halsey.

WOUNDED OR INJURED IN ACTION.—P/O. H. W. Bowker; F/O. L. R. Hobbs.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—W/O. C. McD. Hardcastle.

MISSING, BELIEVED KILLED IN ACTION.—F/O. W. G. Arnold; F/O. R. W. Hill; P/O. G. I. Raymond.

MISSING.—Sgt. J. H. Barkwell; Flt. Sgt. F. G. Bell; Flt. Lt. J. M. Candlish; F/O. E. L. Clary; W/O. J. E. G. Girouard; P/O. J. W. Harrison; Flt. Sgt. D. J. Haug; P/O. B. G. Henderson; W/O. J. J. P. G. Huard; Flt. Lt. S. P. Mariatt; W/O. J. N. G. Milot; F/O. H. B. Pharis; P/O. J. A. Raven; P/O. L. C. Rowe; W/O. H. W. Shaver; F/O. L. J. L. Thibault; P/O. R. H. Wilson.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—W/O. J. H. S. Clarke.

KILLED ON ACTIVE SERVICE.—P/O. J. O. Cross; Flt. Sgt. F. N. S. Fearneley; W/O. E. A. Glauser; Act. Flt. Lt. V. F. McDonald; P/O. G. K. Patman; Flt. Sgt. K. D. Ross.

WOUNDED OR INJURED ON ACTIVE SERVICE.—P/O. T. M. Murdock.

DIED ON ACTIVE SERVICE.—Flt. Sgt. C. A. Dean.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—P/O. J. I. Anderson; Flt. Sgt. D. H. Castling; P/O. H. A. McClee; F/O. F. W. Frudd; Flt. Sgt. J. R. E. Poudrier.

Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. H. C. Duckmanton.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. T. W. J. Warner.

MISSING.—Flt. Sgt. L. S. Crawford-Watson; Flt. Sgt. G. J. Imrie; Flt. Sgt. C. James; P/O. W. B. Masters; P/O. A. R. Stewart; W/O. R. Swift.

KILLED ON ACTIVE SERVICE.—P/O. J. Rothwell.

South African Air Force

MISSING.—Flt. Lt. Baebird.

KILLED ON ACTIVE SERVICE.—Lt. Moore.

Casualty Communiqué No. 336

Of the names in this list, 100 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—Flt. Sgt. E. F. Barge; Flt. Sgt. J. Blackshaw; Flt. Sgt. W. O. Brokensha; Flt. Sgt. D. McG. Burch; Sgt. R. J. Clarke; F/O. D. R. Cooper; Sgt. J. W. Cope; Flt. Sgt. W. G. Dixon; Sgt. C. R. Edbrooke; Flt. Sgt. G. D. Fuller; Flt. Sgt. T. R. J. Harrild; F/O. P. A. Hay-Neave; Flt. Sgt. R. E. John; F/O. L. H. Lister; Sgt. F. Quinn; Flt. Lt. B. M. Rossmagenty; Sgt. S. Tweddle; Flt. Sgt. T. Vair.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. W. F. C. Clague; Sgt. S. A. J. Cook; F/O. E. R. Curtis; Sgt. R. Dyson; Sgt. P. W. Findlay; Sgt. E. G. Halston; Sgt. W. F. Hayllar; Sgt. E. Hopson; Sgt. C. E. W. Hughes; F/O. R. W. J. Letters; Sgt. R. Leyland; F/O. W. Nelson, D.F.C.; F/O. E. Parry; W/O. H. W. Price; Sgt. R. Raven; Sgt. W. E. Waggett; Sgt. F. A. Wells; Sgt. A. W. White; Sgt. F. G. Williams; Sgt. D. H. Yorke.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. G. Beckett; Sgt. W. Bell; Sgt. P. J. Edwards; Sgt. P. Guest; F/O. E. I. Griffiths; Flt. Sgt. A. Hunt; Sgt. G. W. Jones; Sgt. K. R. MacLeod; F/O. L. G. McNamara; Sgt. E. Moore; Sgt. J. S. Priestley; Sgt. N. P. Raynor; Flt. Lt. J. P. Trench, D.S.O.; Sgt. G. Wilson.

WOUNDED OR INJURED IN ACTION.—Sgt. J. K. Finlayson; F/O. H. J. A. Fossion; Sgt. J. E. Hughes.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. D. H. Bentley; Sgt. V. H. Causeway; Flt. Sgt. L. D. Harding; F/O. A. R. F. Jonas; Act. Sqn. Ldr. W. T. Page.

MISSING.—Sgt. P. P. Bacon; Flt. Lt. E. T. Baker; Sgt. C. Barraclough; Sgt. T. W. Blanc; F/O. A. D. Bond; Sgt. G. E. Boucher; Sgt. D. Bumfrey; Sgt. D. G. Button; F/O. D. E. Caudrey; Sgt. F. A. Cheetham; Flt. Lt. F. C. Clarke; Flt. Sgt. J. R. Colley; Flt. Lt. W. C. Dallin; Sgt. M. I. R. Day; Flt. Sgt. A. H. Evans; F/O. R. H. J. Fernandes; Sgt. A. Fogg; Sgt. G. B. Freeman; Sgt. C. Frost; Sgt. G. H. M. Garner; Sgt. W. Gilfillan; Sgt. N. J. Y. Goulding; Sgt. G. B. Grenier; Sgt. R. E. Griffith; F/O. G. S. Hall; F/O. H. B. Hall; F/O. K. E. Herbert; P/O. O. L. R. Hills; F/O. K. Hipwell; Sqn. Ldr. D. O. Hobbis, D.F.C.; Flt. Sgt. T. E. Hooper; P/O. J. Howe; Sgt. R. Inglis; Flt. Lt. S. F. Jefferson; Sgt. R. F. Kincaid; Flt. Sgt. J.

McMorland; Sgt. J. Male; A/C.2 B. P. Maller; Sgt. J. W. Mann; P/O. A. J. Matthews; Sgt. H. R. Peel; Sgt. A. Penfold; Sgt. C. E. Poots; Sgt. R. Powell; Flt. Sgte J. C. Riley; Sgt. H. E. Scarman; P/O. G. J. Steeman; F/O. P. W. S. Smallwood; F/O. R. R. Smart, D.F.C.; W/O. A. F. Smith; Sgt. A. L. Smith; Sgt. J. Smith; Sgt. J. G. Smith; F/O. C. G. Stepney; Sgt. F. Tomachepolsky; Sgt. A. Upton; Sgt. J. R. Vass; Sgt. S. Watkins; Sgt. C. T. Wheldon; Flt. Lt. R. R. Williams; Act. Sqn. Ldr. R. J. S. Wootton, D.F.C.; Flt. Lt. J. Wright; F/O. N. A. Wright; Sgt. R. H. Wright.

KILLED ON ACTIVE SERVICE.—Sgt. R. L. Barton-Smith; Sgt. J. W. Bradshaw; Sgt. F. Brady; F/O. J. D. Bridge; F/O. J. Brown; L.A/C. S. Coote; Sgt. M. J. Coyne; Flt. Sgt. L. J. F. Cullen; Flt. Sgt. J. Davies; Flt. Sgt. R. E. Deakin; F/O. R. P. Dixon; L.A/C. H. Egerton; Sgt. N. F. Grove; Sgt. G. Hall; P/O. H. Hartnett; Sgt. R. J. Huish; Sgt. K. F. C. Imeson; Sgt. H. Jessup; F/O. A. J. R. Knights; Sgt. M. J. Lahausse; L.A/C. K. A. Lodge; L.A/C. E. F. Postlethwaite; Sgt. J. H. Rennie; F/O. D. W. F. Ridgway; Sgt. R. W. Rigby; Act. Sqn. Ldr. D. M. Rolph-Smith, D.F.C.; A/C.2 R. Ross; Sgt. H. D. Ryder; A/C.2 P. A. Shiels; Sgt. F. J. Smith; L.A/C. R. E. Speake; A/C.2 H. H. Sutton; Flt. Sgt. T. J. Wesker; Sgt. R. Winterbottom; Sgt. J. Wood; Sgt. E. G. Young.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED ON ACTIVE SERVICE.—Sgt. W. Neilly.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Sgt. F. J. Atkinson; P/O. W. Bankes; F/O. J. MacF. Brand; A/C.2 L. Connell; Sgt. L. James; Sgt. A. A. Richardson; Cpl. R. Simon.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Sgt. J. Jury; Sgt. E. F. Lurkins.

DIED ON ACTIVE SERVICE.—A/C.1 A. Abela; L.A/C. S. Betts; Sgt. J. G. Buchanan; Flt. Sgt. A. T. Charlwood; A/C.2 T. Davies; L.A/C. H. McC. Dunn; A/C.2 F. P. Lasbury; Act. Sgt. R. C. Lewis; L.A/C. K. Lutner; Wing Cdr. H. J. Maxted; L.A/C. A. Moore; Sgt. J. E. Norman; A/C.2 H. J. Scott; W/O. M. H. Seall; L.A/C. A. S. Smith; Cpl. S. R. Smyth; L.A/C. E. J. Stevens; L.A/C. E. A. Taylor; L.A/C. R. G. Williams.

Women's Auxiliary Air Force

KILLED ON ACTIVE SERVICE.—Act. Flt. Officer P. E. Barton.

DIED ON ACTIVE SERVICE.—L.A/CW. F. Almond; A/CW. J. Kirkwood.

Royal Australian Air Force

KILLED IN ACTION.—Sgt. A. W. Hain.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—P/O. A. J. Beer; Sgt. R. J. Hamilton.

WOUNDED OR INJURED IN ACTION.—F/O. M. A. Crombie.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—P/O. J. A. Jeffreys; Act. Sgt. H. K. Burleigh.

MISSING.—W/O. R. A. B. Blumer; F/O. P. T. I. Hallett, D.F.C.; P/O. N. N. Parker; F/O. A. W. F. Quick; F/O. K. J. Trask.

KILLED ON ACTIVE SERVICE.—Sgt. G. N. Shipway.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Flt. Sgt. W. T. Jones.

Royal Canadian Air Force

KILLED IN ACTION.—Flt. Sgt. A. J. Pudifin; F/O. D. B. Sinclair; W/O. G. Young.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. S. H. Spallin.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. A. J. Bagg; Sgt. C. R. Bird; Sgt. G. R. Black; Act. Flt. Lt. C. S. Campbell, D.F.C.; P/O. E. E. Chouiniere; Flt. Sgt. W. Colangelo; Sgt. W. J. R. Davies; Sgt. W. B. Drake; Wing Cdr. C. J. Fee, D.F.C.; Flt. Sgt. A. F. Guillemette; Flt. Sgt. M. D. W. Hambrook; Sgt. W. D. Hartney; Sgt. C. W. Hollingshead; Flt. Sgt. J. A. Hunter; Sgt. F. S. Jenkins; F/O. F. G. Kendel; Sgt. J. H. M. Kerr; F/O. J. W. Loree; Sgt. D. H. Loyns; F/O. R. N. McCleery; Sgt. D. C. MacDonald; F/O. J. G. McDonald; F/O. L. J. McDougall; Sgt. D. M. McLeod; Sqn. Ldr. M. G. MacLeod; Sgt. H. S. McPherson; Sgt. E. C. Malone; P/O. D. R. Manley; Sgt. W. McK. Martin; Sgt. E. K. Matlock; Act. Flt. Lt. O. K. Middleton; Sgt. H. R. Millson; F/O. J. E. O'Grady; F/O. W. McL. Palmer; Sgt. A. G. Paterson; Sgt. N. F. Paterson; P/O. M. Patrick; Sgt. W. H. Penn; P/O. J. G. Ripley; Flt. Sgt. J. E. Robinson; W/O. J. J. Rooney; Sgt. K. Rushby; W/O. H. A. Sharpe; Sgt. A. J. Skirten; Flt. Sgt. J. H. Sullborn; Sgt. L. J. Switzer; P/O. J. Takvor; Sgt. J. A. M. Tremblay; Flt. Sgt. W. J. Vandervoort; Sgt. E. L. Wagner; Sgt. J. D. Williams; F/O. R. W. Wilsdon; Flt. Sgt. H. E. Wilson.

MISSING.—F/O. D. H. Disney; P/O. C. H. Guest; F/O. J. A. Horsfall; P/O. R. V. Lynch; F/O. E. E. Muffitt.

KILLED ON ACTIVE SERVICE.—F/O. L. B. Abelson; F/O. A. Horn; P/O. M. C. P. Jones; Flt. Sgt. I. S. Sollows.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. L. A. Hoskins; F/O. J. K. Potter.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. D. L. Hogben; Sgt. V. H. Knutson; Sgt. J. R. MacKinnon; Sgt. O. W. Stone.

DIED ON ACTIVE SERVICE.—Flt. Sgt. W. A. Smith.

Royal New Zealand Air Force

KILLED IN ACTION.—Flt. Sgt. W. Hurdle.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—F/O. W. S. Watson.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. H. R. Harrap; P/O. W. G. Sweeney.

MISSING.—F/O. A. G. Greentree; Flt. Sgt. J. E. Hyde; P/O. W. R. Kell; F/O. W. G. Palmer; F/O. G. E. Rawson; P/O. W. B. Tyerman.

KILLED ON ACTIVE SERVICE.—Flt. Sgt. A. G. Sutherland.

South African Air Force

KILLED ON ACTIVE SERVICE.—2/Lt. A. Paton.

Casualty Communiqué No. 337

Of the names in this list 102 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—Sgt. A. B. Boocock; F/O. A. A. S. Bowman; Sgt. P. I. Dursley; Sgt. R. Hallows; Flt. Sgt. B. J. Healy; Sgt. L. Lambourne; Sgt. A. E. Mortley; Sgt. I. R. A. Rudder-Smith; Sgt. A. C. Wells.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. R. J. Ayres; Sgt. A. J. Brockway; Sgt. E. Cavill; Sgt. F. C. Cleaver; Sgt. J. D. Cullcton; P/O. V. J. Dowling; Sgt. A. E. Emms; Sgt. D. E. Funnell; F/O. D. Gartery; Act. Sqn. Ldr. P. Goode; Sgt. F. W. Griggs; Flt. Sgt. R. Hageman; F/O. R. G. Harris; Sgt. M. A. Harrison; Flt. Sgt. F. Hay; Flt. Sgt. A. Heptonstall; Sgt. L. J. Miles; Sgt. L. Marshall; Sgt. H. G. Owen; Sgt. N. A. Peachey; Sgt. D. M. Reed; Flt. Sgt. W. Tatlow; Sgt. J. M. Taylor; P/O. G. Wragge.

Flt. Lt. M. W. Nesbitt, who has won the D.F.C. for many sorties against enemy targets.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. A. H. R. Aggett; Sgt. F. V. G. Alloway; P/O. H. B. Anderson; Sgt. E. G. R. Beacham; Sgt. S. G. Beattie; Sgt. J. Bell; Sgt. E. A. Biggs; Sgt. F. B. Blackbarrow; Flt. Sgt. K. Bolton; P/O. E. W. Bordycott, D.F.M.; Sgt. P. L. Brougham-Faddy; Sgt. E. S. Buck; Sgt. W. Bullen; Sgt. C. V. N. Cogdell; Sgt. I. D. Crawford; F/O. D. G. Denslow; Sgt. L. A. Dunmore; Sgt. E. D. Edwards; Sgt. E. T. Fouet; Sgt. B. H. Gooding; Sgt. D. Grey; Sgt. T. C. J. Grist; Sgt. L. Hannam; Sgt. T. W. Harris; Sgt. R. H. Holtham; Sgt. J. W. Houlgrave; Sgt. J. Howarth; Sgt. F. J. Howell; Sgt. J. P. Ingram; W/O. D. L. Iremonger; Sgt. R. W. Littlefair; Sgt. J. F. McNeill; F/O. G. O. M. Massip de Turville; Sgt. W. Mills; Sgt. J. Mitchell; Sgt. E. S. Morris; Sgt. J. Parkinson; Sgt. T. J. Pritchard; F/O. G. Rawlinson; Sgt. H. Richardson; Sgt. R. Shepherd; Sgt. D. J. Simmons; P/O. F. Smith, D.F.M.; Act. Flt. Lt. A. T. Sprosen; Sgt. J. T. Stephens; P/O. A. J. Teasdel; Sgt. H. B. Thompson; Sgt. L. Thompson; Sgt. G. Watson; F/O. S. H. West; Sgt. J. Westerdale; Sgt. R. F. Williamson; P/O. E. G. Wood; Sgt. J. E. L. Woollam; Flt. Sgt. W. O. Woolnough; Sgt. E. H. Wright; Sgt. W. S. Young.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW REPORTED KILLED IN ACTION.—Act. Group Capt. J. Darwen, D.F.C.; Sgt. S. Griffiths.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. G. W. Allen; Sgt. R. Frith; Flt. Sgt. H. K. Levy; F/O. E. Lister; Sgt. A. D. MacKay; Sgt. F. R. Middleton; F/O. J. R. Moore; F/O. L. Rossner; Sgt. S. F. W. Stephens; Flt. Sgt. G. E. Waddington; Sgt. D. Walsh; Sgt. N. F. A. Whyte.

MISSING.—Sgt. A. W. Aitken; Sgt. W. Aitkenhead; Sgt. G. F. Austin; F/O. K. G. Baldwin; Sgt. E. C. Beacock; Sgt. S. Beedle; Flt. Sgt. J. C. Bevan; F/O. D. E. Blain; Sgt. J. M. Bliss; P/O. P. L. Bowden; Sgt. R. S. Bowers; Sgt. G. E. Boxer; F/O. D. A. Brown; Flt. Sgt. D. F. Brown; Sgt. R. T. Brown; F/O. D. A. Carpenter; Sgt. C. H. Chapman; Sgt. C. W. Charrott; Flt. Sgt. J. W. Childs; P/O. W. Clarkson; P/O. F. Clayton, D.F.M.; P/O. W. G. Clutterbuck; F/O. M. J. Coombe; Act. Flt. Sgt. K. R. Copas; Flt. Sgt. S. Cowley; Sgt. J. M. Cummings; Sgt. D. Curry; Sgt. D. C. S. Davie; Sgt. J. R. G. Day; F/O. E. A. Fielding; Sgt. A. R. Flatters; F/O. A. V. W. Franklin; Sgt. B. F. Franks; Sgt. G. L. Gard; F/O. A. E. W. Gardner; Sgt. T. N. Gibson; Sgt. E. C. Goodwin; Sgt. W. Gordon; F/O. T. C. Graham; F/O. P. L. Green; Sgt. J. H. Harper; Sgt. F. Hemingway; P/O. A. Hine; Sgt. D. L. Hollamby; Sgt. W. C. Hughes; Sgt. S. Irving; Flt. Sgt. J. S. Jarvis; Flt. Sgt. R. E. Jobling; F/O. W. R. John; F/O. J. H. K. Langdon; Sgt. C. E. R. Lane; Sgt. F. Lawrence; Sgt. F. Lawrenson; Sgt. D. J. MacAree; Sgt. D. I. McCallum; Sgt. R. McCormick; F/O. D. V. Mansell; Sgt. G. F. S. Maunders; Sgt. H. Minns; F/O. R. Morrish; Sgt. D. W. Moss; Sgt. A. E. Nattress; P/O. R. W. Newcomb; Sgt. J. Parsons; Sgt. I. S. Paterson; Sgt. E. Pattison; Sgt. W. A. Payne; Act. Flt. Lt. W. G. Peacock; Sgt. W. H. Perry; Sgt. J. H. Phizackles; L.A/C. S. Posner; Sgt. C. J. Poulton; Flt. Sgt. F. J. D. Prebble; Flt. Lt. E. E. Pudsey; Sgt. J. Robson; Sqn. Ldr. C. F. Rose, D.F.C., D.F.M.; Sgt. W. H. E. Rosetta; F/O. C. P. Ross; Sgt. J. D. Scott; Sgt. N. J. Shakespeare; Sgt. J. A. Swift; Flt. Sgt. E. W. Sykes; P/O. J. E. W. Teager; F/O. C. G. Thomas; Sgt. J. A. Thompson; Flt. Lt. J. P. Tremlett; Flt. Lt. J. C. Wade-Seymour; Sgt. E. G. Wall; Sgt. K. Walshaw; F/O. R. W. Wheeler; Sgt. F. C. White.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—P/O. W. J. Halfpenny; Sgt. J. Hodge; Sgt. A. F. Peart; Sgt. J. Rae; L.A/C. J. J. Renwick; Sgt. P. Seager; F/O. H. G. Waugh.

KILLED ON ACTIVE SERVICE.—Sgt. J. W. Barkham; F/O. R. Barr; Sgt. A. G. Beastall; Sgt. J. W. Biscoe; F/O. F. J. Chapman; Sgt. J. W. Harris; Sgt. G. J. Hopkins; Sgt. E. Lyon; Act. W/O. G. A. Timlin; F/O. H. Walker.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—L.A/C. S. A. J. Garner.

WOUNDED OR INJURED ON ACTIVE SERVICE.—Cpl. G. Barker; L.A/C. A. Fletcher; L.A/C. G. S. Franklin; A/C.1 H. Freedman; L.A/C. J. F. Johnson; Sgt. J. D. Jones; Flt. Sgt. D. Mitchell; W/O. W. E. Murphy; Sgt. P. Stevens.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—F/O. W. G. Ripley, D.F.M.; F/O. D. F. A. Welsh.

DIED ON ACTIVE SERVICE.—L.A/C. E. F. Black; L.A/C. L. E. Childe; Act. Flt. Sgt. J. Elsby; A/C.2 A. Fallon; F/O. P. J. R. Flynn, D.F.C.; Cpl. G. S. Goddard; Flt. Lt. W. Howarth; A/C.2 G. L. Jones; Cpl. R. A. Knowles; L.A/C. N. M. Lacey; L.A/C. F. Lawrie; A/C.1 R. Lockitt; Cpl. C. J. Mason; Cpl. M. Morrick; L.A/C. A. Reed; A/C.1 A. J. Ridley; Sgt. E. R. Slade; Sgt. T. W. Spears; L.A/C. E. Todhunter; Flt. Lt. G. W. Warnes; F/O. J. Whiting.

Royal Australian Air Force

MISSING.—W/O. F. M. Cox; Flt. Sgt. N. S. Ferguson; Flt. Sgt. L. W. Heason; P/O. R. McC. Simpson.

DIED ON ACTIVE SERVICE.—Sgt. D. A. Powell.

Royal Canadian Air Force

KILLED IN ACTION.—Flt. Lt. W. E. Merrifield.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—P/O. J. F. X. G. Berthiaume; Flt. Sgt. W. L. Chatfield; W/O. W. J. Hills; P/O. R. H. Logan; Sgt. R. H. Van-Camp; Flt. Sgt. A. C. Worden.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. O. K. Coker; W/O. J. N. P. E. Comeau; Sgt. A. P. Cottam; Sgt. L. T. Delorme; Flt. Sgt. E. H. Masterson; Sgt. W. N. Partridge; Flt. Sgt. L. A. Rivest; Flt. Sgt. J. R. Stewart; Sgt. L. G. Sutherland; F/O. R. A. Urquhart; Flt. Sgt. J. V. J. R. Veys; Sgt. F. E. Winegarden.

MISSING.—F/O. J. L. D. Armstrong; F/O. A. J. Brown; F/O. J. A. MacKinnon; F/O. O. Peck.

KILLED ON ACTIVE SERVICE.—F/O. A. J. F. Symes.

DIED ON ACTIVE SERVICE.—Sgt. W. W. McArthur.

Royal New Zealand Air Force

MISSING.—P/O. J. S. Cabler; F/O. R. A. Turton; Flt. Sgt. O. N. Ussher.

South African Air Force

MISSING.—Act. Flt. Sgt. A. D. Marsbury; 2/Lt. R. G. Parry; Flt. Sgt. F. Van Zyl; Lt. R. H. Yaldwyn.

WOUNDED OR INJURED ON ACTIVE SERVICE.—2/Lt. D. McKenzie.

Using foam to extinguish the flames of a Fortress which caught fire in the air. All the crew except the pilot baled out.

Casualty Communiqué No. 338

Of the names in this list 100 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—Flt. Sgt. J. W. C. Barnard; Sgt. S. G. Bird; F/O. R. A. Blackwell; F/O. A. G. Fleet; Flt. Sgt. R. G. Holding; Sgt. A. E. Moss; Sgt. H. B. Shimwell; Sgt. K. R. Trevelyan; F/O. E. Wade, B.E.M.; Sgt. A. D. Weigh.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. V. Brown.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. G. Allen; Sgt. R. Anderson; Sgt. E. A. Arnold; Flt. Sgt. W. Billington, D.F.M.; Sgt. W. C. Burgess; P/O. E. Challis; Flt. Lt. J. D. Cole; Sgt. T. A. Constable; P/O. C. G. Dawson; Sgt. J. D. Gayton; Sgt. M. Goldrick; Sgt. R. Gowing; Sgt. E. Greenhalgh; Sgt. A. Kemp; Sgt. H. M. Kennard; Sgt. R. D. Kirkup; Sgt. R. G. Martin; Sgt. G. Morrall; Sgt. C. A. Partridge; Sgt. C. K. Phin; Sgt. L. A. Quick; P/O. W. A. Robinson; Sgt. D. B. Sayer; F/O. A. B. Scholey; P/O. R. C. Stemp; Sgt. A. J. Taylor; Sgt. A. Ward; Sgt. B. J. Warr; Sgt. R. J. Whatley.

WOUNDED OR INJURED IN ACTION.—Sgt. G. C. Harris.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—P/O. R. F. Martin; P/O. F. E. G. Salmon.

MISSING, BELIEVED KILLED IN ACTION.—Flt. Sgt. A. C. A. Gardener; W/O. R. Lindsey; Sgt. M. Monaghan; Sgt. J. Saffrey.

MISSING.—Sgt. R. Anderson; Sgt. E. A. D. Barnes; Sgt. E. W. Bates; F/O. M. F. Baxter; Sgt. L. Bettaney; Sgt. A. Buchan; P/O. N. F. Buggey; Flt. Sgt. J. Clapperton; Sgt. L. H. Cooper; Sgt. T. Cubitt; Flt. Sgt. N. S. Curtis; Sgt. H. E. M. Dulieu; F/O. M. P. Dunkerley; Sgt. C. R. M. Edgar; Sgt. J. Edmunds; Sgt. F. J. Fay; A/C.2 J. A. France; Sgt. W. G. Gamage; Sgt. L. C. Grant; F/O. F. P. Graves; Sgt. N. Hall; F/O. N. A. Hattersley; Sgt. F. P. Heaton; P/O. R. Henderson; F/O. C. G. S. Hodgkinson; A/C.2 L. G. Hopkins; Sgt. C. Hill; Sgt. C. R. E. Hunt; A/C.2 D. J. Hunter; Sgt. R. Jefcoat; Sgt. J. A. Johnstone; Sgt. R. J. Jones; Sgt. K. Lance; Sgt. R. W. Lenton; Sgt. G. W. Leverington; Sgt. J. P. McAdam; Sgt. T. H. R. McKeag; Sgt. D. MacKenzie; Sgt. H. F. McKernin; Sgt. J. McMillan; F/O. G. D. L. Machin; A/C.2 A. B. Marshall; Sgt. E. D. Morrison; Sgt. W. F. Neill; Sgt. H. D. Newey; Sgt. T. R. Oxley; Sgt. J. E. Owen; Sgt. G. O. Payne; Sgt. C. H. Pell; Sgt. F. Phelan; Flt. Lt. D. S. Pont; Sgt. P. H. Potter; Sgt. J. Pottinger; Flt. Sgt. J. Prendergast; Sgt. D. G. Rees; Sgt. P. G. Roberts; L.A/C. R. J. Rochford; Sgt. S. J. Ryan; Sgt. W. Shaw; Sgt. L. F. Shirley; Sgt. P. I. Smith; P/O. T. G. Stephens, D.F.M.; Sgt. T. Stocks, D.F.M.; Sgt. A. F. Sutherland; Sgt. H. Truscott; Sgt. G. H. C. Wade; Flt. Sgt. R. Walton; Sgt. D. S. Ward; Sgt. A. D. Warder; Sgt. W. Wharton; Flt. Sgt. J. F. B. White; Flt. Sgt. J. F. Whitley; Sgt. J. G. Williams; Sgt. M. N. Williams; Sgt. D. G. Woods; Sgt. R. V. Woods; Sgt. G. G. Worley.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Flt. Sgt. F. Bradbury; A/C.1 H. Brazier.

KILLED ON ACTIVE SERVICE.—P/O. E. S. Atkinson; Sgt. C. W. H. Baughen; F/O. G. Booth; Sgt. I. C. Brough; F/O. J. C. W. Bruce, D.F.C.; A/C.2 K. Clarkson; P/O. F. A. Dines; Sqn. Ldr. P. J. Emerton; Sgt. H. Ganly; Sgt. W. Gavin; Sgt. B. A. Gibbs; Sgt. F. D. Grant; Sgt. W. Halliwell; A/C.1 G. H. Harrison; L.A/C. F. W. Hiles; Sgt. L. J. Hill; F/O. J. P. Hunt; Sgt. J. G. Kirby; Sgt. D. Kneale; F/O. W. Laskie; F/O. J. K. L. Paterson; Sgt. E. W. Plowman; Sgt. D. J. Roberts; A/C.1 S. Rosenthal; P/O. S. G. Scutt; Flt. Sgt. J. Shepherd; Sgt. W. Sykes; Sgt. L. W. Swindells; A/C.1 N. Wade.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Flt. Sgt. W. J. Bryan; P/O. F. H. Dinnage; F/O. L. G. Littell.

WOUNDED OR INJURED ON ACTIVE SERVICE.—A/C.2 J. J. Coleby; A/C.2 M. F. G. Dove; F/O. P. R. Green; Cpl. C. Hamer; F/O. E. J. Holman; L.A/C. W. P. Logan; A/C.2 R. McG. Mullan; A/C.2 H. Pilkington; L.A/C. R. J. Wood.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—A/C.2 C. H. Beach; P/O. N. N. Beale; F/O. H. Stewart; Act. Flt. Lt. J. Steele.

DIED ON ACTIVE SERVICE.—Cpl. R. E. Baragwarath; L.A/C. S. Buckley; F/O. A. P. Carter; L.A/C. E. A. Curnow; Cpl. L. G. L. Lane; L.A/C. H. P. Moody; A/C.1 J. D. Sothcott; A/C.1 A. Wilkinson.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Act. Sqn. Ldr. G. R. Carpenter; Sgt. D. A. Clark; P/O. P. N. Croft; Sgt. E. H. Eke; Sgt. E. W. Evans; Sgt. J. B. King; Sgt. R. F. Limage; Flt. Lt. E. S. A. Sniders; F/O. D. Towers.

Women's Auxiliary Air Force

KILLED ON ACTIVE SERVICE.—A/CW.2 D. M. Adams.

DIED ON ACTIVE SERVICE.—A/CW.1 J. Lawrence.

Royal Australian Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt, F. G. Latham; Flt. Sgt. C. J. J. Wellesley.

WOUNDED OR INJURED IN ACTION.—F/O. J. H. Hand.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—F/O. J. S. Pullar.

MISSING.—Flt. Sgt. E. A. Dunlop; Flt. Sgt. O. D. Hodgkinson; Sgt. J. G. Ley; Flt. Sgt. S. McC. List; Flt. Sgt. D. M. Rutter.

KILLED ON ACTIVE SERVICE.—Sgt. J. H. Lewis.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—P/O. R. A. Brawn.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Flt. Sgt. B. J. Lewis.

Royal Canadian Air Force

KILLED IN ACTION.—F/O. R. G. Eaton; P/O. B. A. Elmore; F/O. A. K. Hodgkinson; P/O. A. E. MacKenzie; F/O. L. L. Whitham.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Sgt. P. E. Barron; Sgt. S. V. Bradshaw; F/O. B. A. Grant; P/O. R. J. Gunn; F/O. R. C. MacQuoid.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. A. B. Amirault; F/O. L. O. Armstrong; Sgt. W. J. Arnold; P/O. G. R. Baker; Sgt. R. F. Beckett; F/O. G. A. Calder; Flt. Sgt. H. A. Crouse; Flt. Sgt. R. D. Bourke; F/O. L. A. Dingley; Sgt. R. I. Edwards; Sgt. J. E. Evans; P/O. E. J. Fry; Sgt. J. O. E. Gauthier; F/O. H. S. Glinz; Sgt. L. G. Haines; Sgt. O. O. Henderson; F/O. A. R. Hickey; Flt. Sgt. A. M. Horne, D.F.M.; Sgt. P. J. Howe; Flt. Sgt. D. C. Hunter; Sgt. P. J. Ireland; F/O. L. T. Izzard; Sgt. P. G. Kelly; Sgt. J. C. Kennedy; Sgt. E. E. Lundy; Flt. Sgt. E. McDermott; Act. Flt. Lt. D. M. McKenzie; F/O. N. M. McLellan; Flt. Sgt. B. MacNall; Sgt. W. E. Mann; Sgt. R. B. Mantha; F/O. J. R. Mowbray; Sgt. L. Murphy; Sgt. G. D. Nisbett; F/O. C. W. O'Brien; F/O. H. N. Petts; Sgt. A. Podolsky; Flt. Sgt. F. W. Ralph; P/O. A. F. Reif; P/O. J. L. Rossignol; Sgt. A. S. Thomson; Sgt. D. C. Way; Flt Sgt. E. A. Whalen; Sgt. W. H. Wyatt.

MISSING, BELIEVED KILLED IN ACTION.—F/O. C. E. Brandt; Sgt. J. T. Costello; Flt. Sgt. K. L. Dale.

MISSING.—Flt. Sgt. M. O. M. Bell; F/O. C. W. Blagborne; Sgt. R. H. Butler; Flt. Sgt. G. J. Byers; Sgt. E. J. Helm; P/O. T. W. Hilliard; F/O. W. H. Jacobs; Sgt. J. E. James; W/O. J. L. Kelly; Sgt. N. McBride; Flt. Sgt. F. T. McCutcheon; Flt. Sgt. C. M. MacDonald; Sgt. A. V. McIntosh; W/O. G. F. McKinnon; Flt. Sgt. C. P. Miller; F/O. D. A. Naismith; F/O. J. E. Sauve; Sgt. R. C. Smith; Flt. Sgt. R. H. Vance; Flt. Sgt. R. A. Young.

KILLED ON ACTIVE SERVICE.—Sgt. E. A. Hoare.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. D. E. S. Cameron.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—P/O. H. H. Welch.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—P/O. J. E. Abbotts; F/O. J. D. Colds.

Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—F/O. K. T. Estcourt.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. D. G. King; Flt. Sgt. P. G. Roberts.

MISSING, BELIEVED KILLED IN ACTION.—Flt. Lt. J. S. Hay.

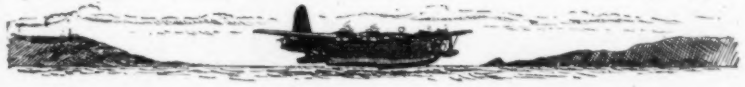
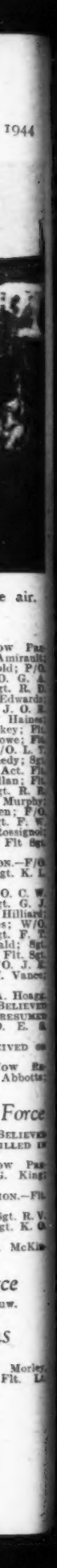
MISSING.—Flt. Sgt. M. B. Laing; Flt. Sgt. R. V. Love; Act. Flt. Lt. F. L. Perrers; Flt. Sgt. K. O. Schultz; W/O. M. D. Smith.

KILLED ON ACTIVE SERVICE.—F/O. T. McKinley, D.F.C.

South African Air Force

DIED ON ACTIVE SERVICE.—Cpl. V. Louw.

Official Corrections

Casualty Communiqué No. 334.

Under "MISSING" delete Sgt. R. C. Morley, R.C.A.F.; under "MISSING" delete Flt. Lt. J. L. J. Kennedy.